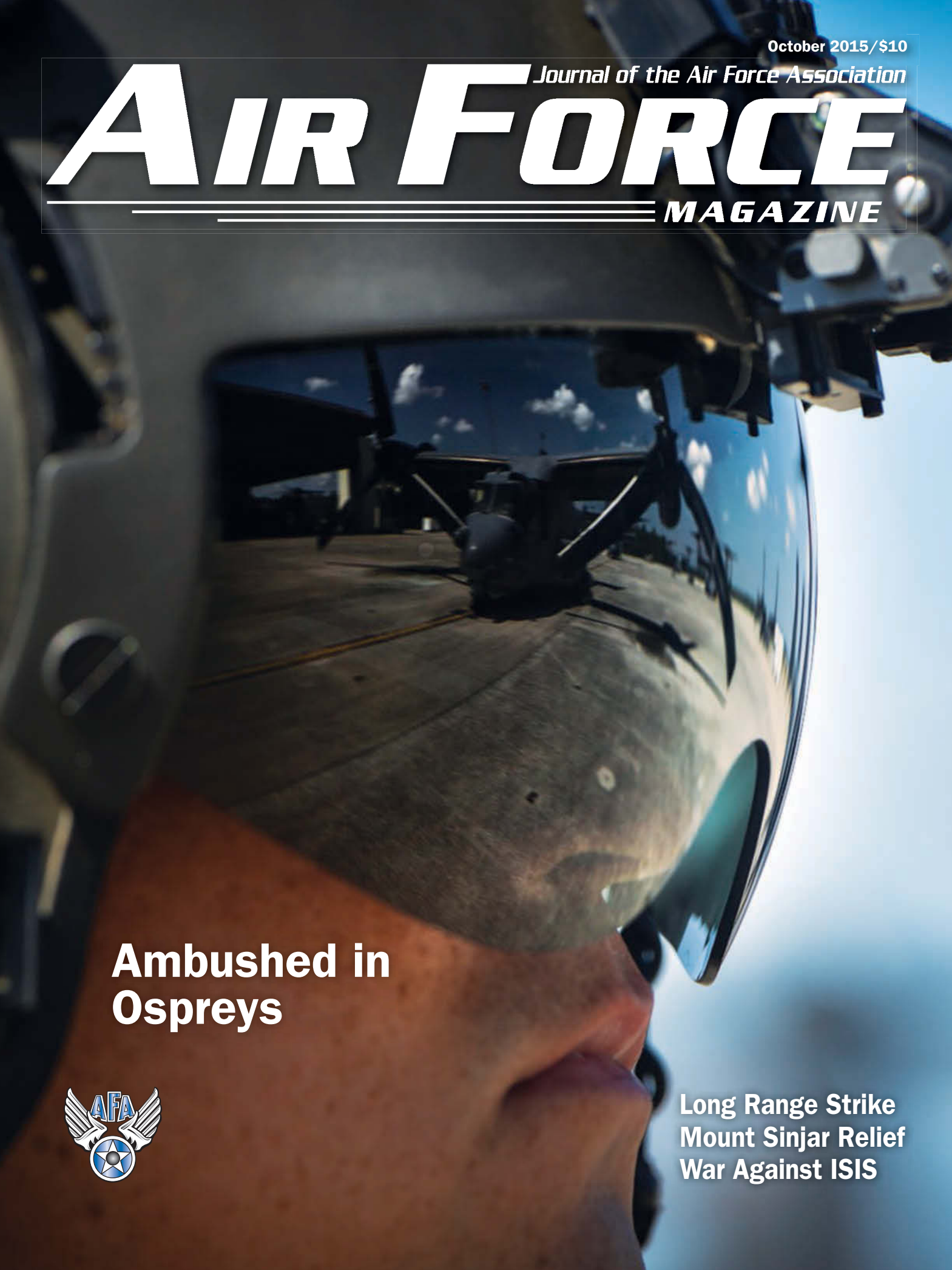
October 2015/$10

Journal of the Air Force Association

# AIR FORCE MAGAZINE



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## FEATURES

4 **Editorial: Better ... Stronger ... Faster**
By Adam J. Hebert
*To stay in front, USAF needs unprecedented agility in acquisition and from its systems.*

20 **The Future of Long-Range Strike**
By John A. Tirpak
*Today's B-52, B-1, and B-2 fleets will be heavy hitters for years to come.*

28 **All for One in NATO**
By Marc V. Schanz
*Because of Russia, NATO's core mission—collective defense—is a focal point once again.*

34 **Blood Over Bor**
By Aaron M. U. Church
*A CV-22 mission to evacuate Americans from violence in South Sudan nearly killed the rescuers.*

39 **Operation Inherent Resolve**
Photography by USAF photographers
Text by Aaron M. U. Church
*Hitting ISIS where it hurts.*

50 **Breaking the Siege on Sinjar**
By Jennifer Hlad
*USAF stepped in with an urgent relief effort when ISIS threatened a humanitarian catastrophe.*

56 **The Nightmare Before Christmas**
By Peter Grier
*The disastrous early days of Linebacker II forced the Air Force to find a new approach for B-52s against Hanoi.*

62 **The Super**
By John T. Correll
*J. Robert Oppenheimer and his colleagues opposed development of the hydrogen bomb.*

**About the cover:** A CV-22 is reflected off MSgt. David Shea's helmet. Shea helped rescue Americans during a firefight in South Sudan. See "Blood Over Bor," p. 34. Photo courtesy of Sean Mendis.

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## DEPARTMENTS


6 **Letters**

9 **Action in Congress:** *Republicans on the Defense Trail*

10 **Aperture:** *USAF status report; Dangers of a CR; Hitting ISIS; Women in Special Ops ....*

12 **Air Force World**

16 **Index to Advertisers**

19 **Senior Staff Changes**

27 **Verbatim**

49 **Flashback:** *The King (Serial No. 19125741)*

68 **Books**

70 **The Keeper File:** *MacArthur Warns: Accept No Substitutes*

72 **AFA National Report**

74 **Reunions**

76 **Airpower Classics:** *F-16 Fighting Falcon*



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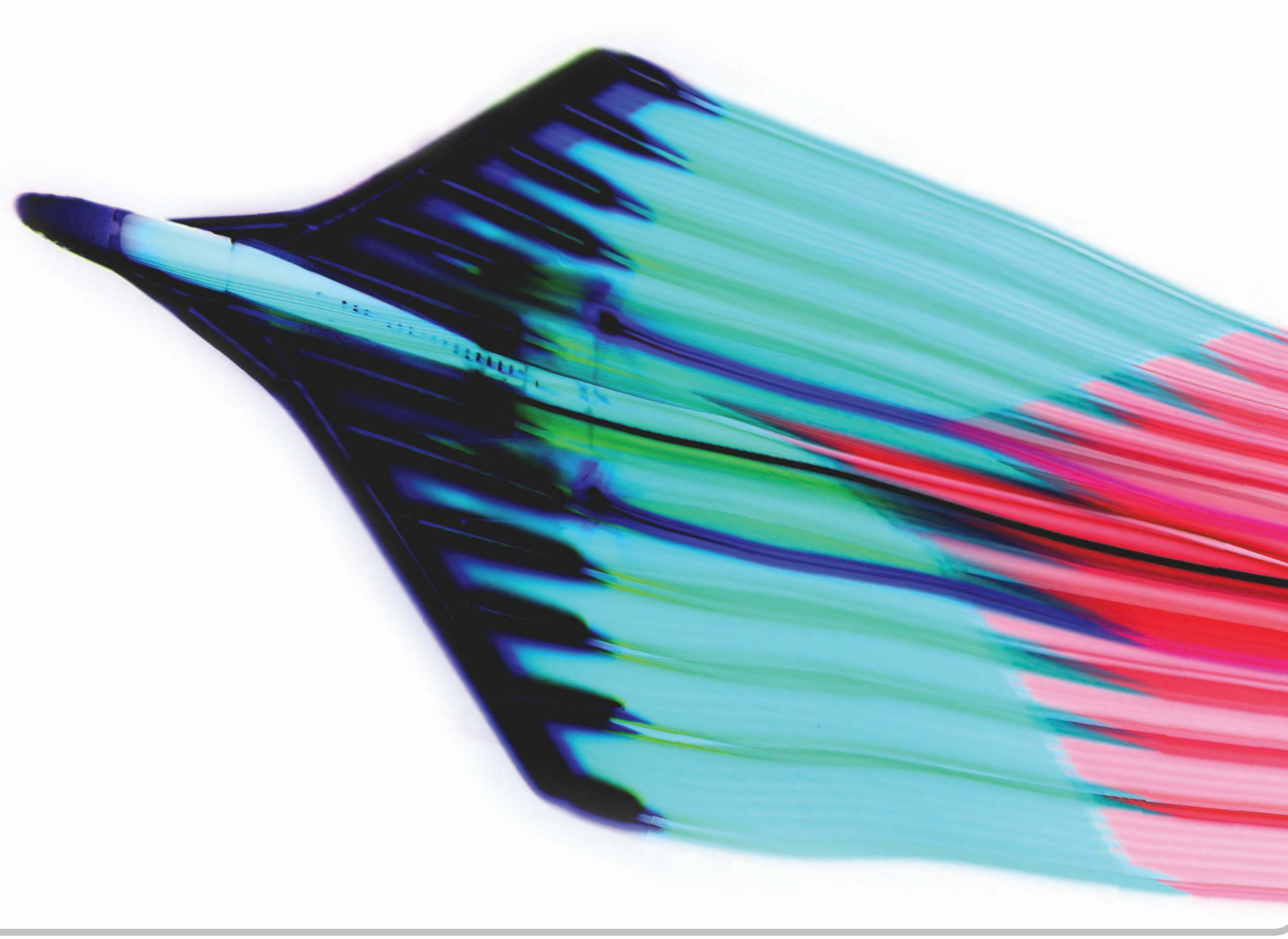

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# Editorial

**By Adam J. Hebert,** Editor in Chief

# Better ... Stronger ... Faster

Military acquisition and procurement has always, and will always, be difficult. The military requires specialized, bespoke solutions to complex problems, frequently in small quantities. A labyrinth of laws, rules, budget uncertainties, and politics further complicate the process.

It is no wonder, then, that for as long as there has been a military procurement system, there have been efforts to improve and reform it. Common complaints are that the system takes too long, is too expensive, and is too resistant to change.

Drawing on lessons from recent years, Air Force leaders are moving today to get ahead of some of the military acquisition system's long-standing problems.

First comes a dose of reality. Even if DOD is spared near-term budget disasters, such as a year-long continuing resolution or a return of sequestration, the Air Force's budget is probably not going to be increasing. USAF cannot afford to start a large number of programs with bills that will all come due at some later date when it is hoped that sufficient funding will magically appear.

Service leaders are therefore now taking pains to ensure that programs are timed so that they are affordable relative to realistic future funding—as individual programs and collectively.

To free up funding, sometimes old systems need to make way for new systems. This creates operational risk, and frequently brings about the wrath of Congress. But the Air Force cannot afford to keep old equipment in service forever, because doing so crowds out funding and manpower needed to launch new programs with greater capability.

Recent high-profile examples have included Air Force efforts to divest the A-10 fleet to shift dollars and personnel to the F-35 program; attempts to retire the venerable U-2 spyplane in favor of the unmanned RQ-4 Global Hawk; and a proposal to retire five E-8C JSTARS aircraft to free up funding as a downpayment on the JSTARS Recap program.

The second lesson of recent years is a need to develop systems faster, and top officials are now looking for options to speed up future acquisition programs. One possible scenario could be an independent "should schedule" assessment, modeled on the "should cost" evaluations major defense acquisition programs receive.

The independent assessments use historical norms to determine how much a program should cost and how long it should take, so officials can budget and plan realistically. But DOD has had some recent success bringing programs along faster and cheaper compared to a decade ago, and the historical averages may no longer represent what is realistically possible.

Bottom line: If the Air Force can accelerate programs, it wants to do so.

**To stay in front, USAF needs unprecedented agility in acquisition and from its systems.**

Air Force Materiel Command, which has cradle-to-grave responsibility to develop, sustain, and modernize USAF's weapons systems, recently released new mission and vision statements. The command is trying to develop more effective systems, faster. Tellingly, both the mission and vision now include the word "agile."

Gen. Ellen M. Pawlikowski, AFMC commander, noted there are two ways to provide agility. First, there needs to be nimble development processes, so the Air Force fields better equipment sooner in close partnership with those who will be using the equipment. She said that, generally speaking, the more people who are involved in a development program, the slower that program will progress. Pawlikowksi said that for important programs, she just wants to "get the right people on the bus and hit the accelerator."

Meanwhile, the equipment itself should be designed for agility: flexible, versatile, and adaptable with open architectures and built-in room for growth. This is the B-52 model, as the BUFF is a case study in how a system can be adapted to change with the times.

Pawlikowski said this sort of adaptability should be planned for programs from the beginning, creating systems that can be modified and enhanced later.

The Air Force is no longer facing static, set-piece threats that evolve slowly, she noted in September. It was just over a year ago that Russia illegally seized Crimea and initiated a covert war in Ukraine, and the US-led air war against ISIS in Iraq and Syria is also barely a year old. USAF needs to quickly develop systems that can change with the times to keep pace with—and get ahead of—unpredictable enemies, because the world will change whether the Air Force does or not.

After a long procurement holiday, the number of urgent USAF acquisition programs is quickly piling up. William A. LaPlante, Air Force acquisition executive, quipped in September that you can make anything an urgent operational need "if you wait long enough."

The Air Force is rapidly approaching that point. Programs such as the Long-Range Strike Bomber, the JSTARS recapitalization, the KC-46 tanker, the T-X trainer, and the next generation Ground-Based Strategic Deterrent will all be replacing key systems that are decades old.

Many of the legacy systems, such as the B-52 bomber, the T-38 trainer, and the KC-135 tanker, date back to the 1950s or early 1960s. The Air Force needs the stealthy F-35 attack jet to replace 30-year-old front-line fighters. Today's E-8 JSTARS aircraft are in high demand but have exorbitant operating costs and are based on obsolete Boeing 707 airframes that were already used when they were "new" to the Air Force.

It is in this environment that Gen. Mark A. Welsh III, Chief of Staff, said at the Air Force Association's Air & Space Conference Sept. 15, "If we want to have acquisition reform, we are all going to have to accept some risk." He added that the capability gap between the Air Force and the rest of the world is closing fast.

USAF has made great progress in acquisition in recent years, but it is time to institutionalize the successes and address the problem areas.

There is much to be done, in limited time, and with tight budgets. Smart planning and agility are needed if the Air Force is going to maintain and embrace its combat advantage. The service will need to take some chances to obtain the benefits of strategic agility. It must be allowed to take these chances. ✪

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# Letters

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**Japanese Fringe**

John T. Correll's article, "The Year of the Kamikaze" (August, p. 56) was well-written and accurate—up until the last paragraph. There he goes from fact to fiction, offering a somewhat veiled warning that the Japanese public's more favorable perception of the kamikaze potentially foreshadows a more militarily resurgent Japan. He couldn't be further from the truth.

Correll asserts that the popularity of the recent movie "The Eternal Zero" is an example of this change in perception. However, he missed the nuance of the film—the underlying theme of which is one that appears frequently in Japanese cinema—that the country was deceived and misled by its wartime leaders, yet the nation's soldiers individually devoted their lives to honorably defend their country. The film does not glorify the military or the kamikaze pilots—in fact it shows them as victims, forced to sacrifice their lives in what was clearly a futile endeavor.

Japan has some fairly high-profile personalities with very far-right views; Retired Gen. Toshio Tamogami (a former Air Self-Defense Force Chief of Staff) and former Tokyo Mayor Shintaro Ishihara are examples. They seek a return to a militarily aggressive Japan and offer revisionist views regarding the country's WW II atrocities. Yet their views are clearly on the fringe of Japanese society and not seen as credible by the general public.

There is no more clear evidence of the public's continuing commitment to pacifism than their opposition to Prime Minister Shinzo Abe's current, very modest proposals to modify Japan's constitutional limits on collective self-defense. The most recent polling has these proposals being opposed by a large majority of the population: 53 percent against, only 29 percent supporting (*Asahi Shimbun,* July 20, 2015). The primary reason for nonsupport, whether accurate or not, is a widespread belief that these changes will increase the possibility of Japan being involved in a military conflict.

On a recent Sunday in late August, over 25,000 people demonstrated against these constitutional changes in downtown Tokyo, significant given the general apathy of the pubic over the past several decades to political issues. While Prime Minister Abe desires, and the US government supports, a more assertive military role for Japan in Asia, the Japanese public clearly has other ideas, and one can't argue with their logic: As celebrated in September, Japan has remained at peace for 70 years. What other major industrialized country can make a similar statement?

Col. James D. Brophy II,
USAF (Ret.)
Tokyo

I wrote "The Kamikazes: Japanese Suicide Units" for the July-August 1994 issue of *Naval Aviation News.* It was part of that magazine's series of commemorative articles observing the 50th anniversary of World War II. I enjoyed John T. Correll's story. Many of his points agreed with my own, particularly that the overall effect of the kamikazes was "not strategically significant in the long run." Of course, sinking 33 Allied and damaging 286 ships was not to be ignored. I doubt that if you were in those crews, you would consider the suicide attacks insignificant.

My father was on his way to a destroyer off Okinawa in May 1945. He had left my mother in New York City, pregnant with me (I was born in early June, and she never knew exactly where he was.). He was standing at the bus stop at Alameda [Calif.], orders in hand, for a ride to the piers where he would catch a transport to Pearl Harbor and then out to his new assignment off Japan. At the last moment it seems, a jeep came up and its driver told him his orders had been changed. He was, indeed, going to Pearl, but had been reassigned to a top-secret shore unit making invasion maps—the ones to be

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held by the amphibious units as they hit the beach during the actual invasion of the home islands late in 1945 or 1946. That was as far west as he got as the Japanese surrendered in August.

While writing my kamikaze story, I asked fellow researcher and author Henry Sakaida for information. He told me, "There were divided opinions about the kamikaze effort. Zero pilot [and top surviving Japanese ace] Saburo Sakai was initially for it, but later on, thought that it was a complete waste. There were others of higher rank who felt the same, but they had to keep their thoughts to themselves." Henry went on. "The scarcity of aircraft at the end of the war and fuel was very evident. Schoolkids went out in the mountains to gather pine cones, which could be processed to produce oil (fuel). Some of the biplane trainers used alcohol. They actually had plans to fly these biplanes in the final kamikaze raids."

If you can find a copy, *Kamikaze* is a memoir written by a very young Japanese army air force fighter pilot (Hayabusa/Oscar) who was saved by the Japanese surrender only a few days before he was scheduled to fly his own suicide mission. The book was originally published by Ballantine in the 1950s, but I think it has been republished since then. As an introduction to my article, I used the author's description watching his lifelong friend fly an obsolete Type 96 (Claude) fighter against Allied ships. It is a very personal account that is worth searching out.

Cmdr. Peter B. Mersky,
USNR (Ret.)
Alexandria, Va.

**Arm Rasslin'**

A few days ago I had a conversation with an Army friend. We were talking about close air support, and he opined that while the Air Force had "developed a few niches, its primary function remained to support the Army" *["Action in Congress," June, p. 5].* After a few words of exchange, we decided to talk about golf. Later I began to think about missions and the services, and then it occurred to me that we are at it again, behaving like the "heavy equipment operators" a former CSAF suggested we'd become if we didn't elevate our thinking. There's going to be an A-10 vs. F-35 fly-off in 2018 to determine the best CAS solution (and hopefully achieve some muting of political criticism). This AF vs. AF contest—seeing which platform suits the needs of our sister service—seems like a pretty narrow act, likely serving only to perturb the service and its critics and the eventual recipients of CAS as well. Since CAS is a mission, why isn't this evaluation considering all the resources used supporting the ground commander and his forces? How and where do the Cobra and the Apache contribute? How about the Predator and Reaper? Isn't the AC-130 a CAS resource, too? Seems like we actually have a joint investment in the mission. Wouldn't our joint future capability for CAS be better if we looked at the spectrum of mission resources rather than having an Air Force arm wrestling match in public? Not sure why 2018 was chosen as the start date for this comparison, but it certainly gives DOD time to open the aperture and examine the mission, and not just a couple of platforms.

Col. Steve Mosier,
USAF (Ret.)
Williamsburg, Va.

**Spyplane Vs. Spyplane**

Further clarification of the picture of the "A-12s secret CIA spyplanes," June 2015, p. 30. Colonel Mutch had it almost perfectly accurate *["Letters: No Lake Wobegone," August, p. 5].*

Following are some additional facts about these magnificent aircraft. Yes, the picture shows an aircraft with a second crew station and the A-12 was a single-seat aircraft. The picture is an SR-71. I can tell that by the tail No. 17964 ( as seen in enlarged depiction). It is also true that the A-12 production was interrupted to accommodate the production of three YF-12s. After the YF-12s, the assembly line went back to produce a total of 15 A-12s, of which 12 were one-seat aircraft [and] three were two-seaters. One of the three was a trainer and the last two production

aircraft were A-12s designated as M-21s. These aircraft carried a reconnaissance drone on top of the aft fuselage. That program was known at "Tagboard." The second seat accommodated the launch control officer (LCO) who launched the drone at approximately Mach 3.2.

Col. Sam Ursini,
USAF (Ret.)
Rancho Santa Fe, Calif.

**JSTARS, the Transformer**

It is great that the Air Force says it plans to keep its ISR iron triad *["ISR Iron Triad," August, p. 38]* viable for decades to come. Unfortunately, these plans show that the Air Force still does not fully appreciate how the unprecedented capabilities of the E-8 JSTARS are transforming the way we defeat land forces.

Napoleon explained why a platform like JSTARS is so important when he said that "aptitude for war is aptitude for movement. ... Victory is to the armies which maneuver." Movement is how armies create the key advantages of surprise, mass, and position. But now JSTARS makes it possible to exploit the importance of an army's movement with its unprecedented ability to detect, locate, track, and target vehicles attempting to move throughout a large area, even when these vehicles move at night or in bad weather. Analysis and experience show that this capability is an extremely powerful force multiplier, allowing a relatively small number of attack aircraft to have an even greater impact than previously would have been possible with hundreds, if not thousands, of attack sorties. Thanks to JSTARS, it is possible to put an enemy commander on the horns of a dilemma that has no satisfactory answer. If he attempts to move his forces, JSTARS targeting can inflict unacceptable losses; but if he attempts to reduce his army's vulnerability by not moving, he loses all the advantages that movement can provide while simultaneously allowing more time for his forces to be detected, located, targeted and destroyed.

Yet despite all the advantages that JSTARS' unprecedented capabilities provide, the Air Force's plans continue to show, as Col. Henry L. Cyr, the JSTARS wing commander, has stated, the system's mission is "not well understood." If the Air Force really understood the unprecedented advantages possible with JSTARS, it would not have prematurely stopped the system's production. Nor would it have failed to equip the E-8 with new engines that would have dramatically increased the system's performance, efficiency, and reliability. It is interesting that the Air Force says the E-8 fleet has grown increasingly expensive to maintain due to its age, when the E-3 fleet is even older and the Air Force has equipped many other types of old, but valuable, aircraft with new engines. So here we are in the midst of a war with ISIS without enough JSTARS to provide adequate coverage of the areas where ISIS is operating, and the Air Force is planning to cut the size of the existing JSTARS fleet in order to save money for its replacement with a new, smaller jet that won't be ready to operate until 2023. I am truly amazed!

Lt. Col. Price T. Bingham,
USAF (Ret.)
Melbourne, Fla.

**Spies on Guam**

The August 2015 *Air Force Magazine* article "Bombers on Guam" *[p. 20]* states that bombers have been rotating to Guam since 2004 as part of USAF's strategic deterrence mission.

Maybe not continuously, but it's been going on a lot longer than that.

During the summers of 1953 and 1954, I was a member of the 509th BW, flying the B-50D, with a nuclear mission, doing three-month TDYs to Guam in support of the Korean War.

I've always felt our wing was an important factor in establishing the truce. When the North Koreans and Chinese walked out of peace talks, our wing went to a very visible alert status. A few days later the talks resumed and we know the rest of the story. It's my belief that the (known) spies on Guam reported that the Americans were getting serious and maybe it was time to return to the table!

Lt. Col. George M. Gordon,
USAF (Ret.)
Stuart, Fla.

By Megan Scully

# Republicans on the Defense Trail

Recent Air Force retiree Lindsey O. Graham is trying to get a foothold in the crowded field of GOP presidential contenders by staking out a spot as the group's most vocal and persistent hawk.

The South Carolina senator, a senior Armed Services Committee member, has used his candidacy to warn of dire security threats to the United States, decry the Obama Administration's nuclear deal with Iran, and stress the need for robust defense funding.

Graham's campaign website boasts that the retired Air Force Reserve colonel is "ready to be Commander in Chief on Day One" and is "willing to do whatever it takes, as long as it takes," to defeat the ISIS terrorist group. That, he has said, would include nearly tripling the US military presence in Iraq to about 10,000 troops, and sending perhaps another 10,000 service members to Syria.

"I hope over time we'll start realizing the next President needs to straighten out the world that's falling apart. They'll start thinking about experience when it comes to Commander in Chief and protecting us all," Graham said on MSNBC Sept. 2.

But despite his military experience, Armed Services pedigree, and his hawkish bravado, Graham is barely registering in national polls and falls well behind many of the other candidates in his own home state.

Even support from former GOP presidential contender Sen. John McCain of Arizona, the chairman of the Armed Services Committee who jokingly refers to Graham as his "illegitimate son," has done little to boost his numbers in New Hampshire, a long-time McCain stronghold.

On the other end of the spectrum, Kentucky Sen. Rand Paul's far more isolationist rhetoric is also not registering with the base, an indication that security and international affairs are second-tier issues, at least at this point.

"Other issues and other themes right now are significantly more dominant, and that includes domestic issues, if we consider immigration a domestic issue," said Norman J. Ornstein, a political scientist at the American Enterprise Institute. "And it includes the broader theme of, 'Are you part of the establishment that has so repeatedly lied to us and misled us, or are you one of the outsiders?'"

All of this is somewhat surprising, considering a *Wall Street Journal*/ABC News poll in May found that 27 percent of Republican primary voters considered national security and terrorism the government's highest priority, more than double the percentage of Democratic primary voters who ranked them tops.

Photo by Gage Skidmore

Photo by Michael Vadon


Much of the focus can likely be attributed to the GOP front-runner, Donald Trump, who has largely avoided security issues. By early September, after leading in the polls for nearly a month, The only position paper on Trump's website was immigration reform, a stark contrast to Graham's detailed national security vision.

But some other candidates are attempting to shift focus to security, delivering speeches in recent weeks broadly outlining their plans, should they be the next Commander in Chief. After all, it's hard to clinch the GOP nomination without addressing defense.

At an Aug. 31 event in Michigan, Ohio Gov. John Kasich blasted cuts to the defense budget, signaling that military spending would be a priority in his administration.

"We've allowed the Pentagon and needs of defense to be eroded over time," he said, according to the *Detroit Free Press*. "It's a matter of creating priorities. You fund the things that are critical to you."

Later that day, Kasich sounded another decidedly hawkish tone, telling Fox News that the military needs to be both mobile and lethal.

"And we need to do the things we need to do to make sure that America's security is second to none anywhere in the world," he said. "We are the leader of the world and we ought to stop thinking we are not or apologizing for it."

Meanwhile, Wisconsin Gov. Scott Walker delivered an Aug. 28 foreign policy speech at the Citadel in South Carolina in which he stressed American intervention, saying the United States cannot be "passive spectators while the world descends into chaos."

"As President, I will send the following message: The retreat is over," he said.

And former Florida Gov. Jeb Bush has tried to bolster his national security cred since the outset of his campaign, even as he has struggled to distance himself from his brother's unpopular policies and assure voters he is his own man.

During an Aug. 14 speech at the Iowa State Fair, Bush vowed to have a strategy to defeat ISIS from his first day in office.

"I believe we are on the verge of the greatest time to be alive if we are strong, rebuild our military, show support for the veterans, bring back competency in government, and grow our economy at a far faster rate," he said.

The next few months will determine whether voters agree. ✪

*Megan Scully is a reporter for* CQ Roll Call.

# Aperture

**By John A. Tirpak,** Editorial Director

**USAF status report; Dangers of a CR; Hitting ISIS; Women in Special Ops ....**

## STATE OF THE AIR FORCE

The biggest threat to the Air Force is not necessarily foreign enemies—against which USAF is having great success—but chronic uncertainty about future funding, despite there being no letup in the service's very high operating tempo, USAF's top leaders said in August.

Air Force Secretary Deborah Lee James and Chief of Staff Gen. Mark A. Welsh III, delivering what's become a twice-annual "State of the Air Force" briefing at the Pentagon, said USAF's capabilities have been in unusually great demand during the last year.

James ticked off a formidable list of operations and activities undertaken by the service, including humanitarian relief in Nepal, response to the Ebola outbreak in West Africa, and "ongoing commitments in Afghanistan" and to Pacific allies. "We've stood watch on the Korean Peninsula and we've reassured our allies in Europe in the face of a resurgent Russia," James added, all the while maintaining a "24/7" pace of attacks and surveillance operations over ISIS-controlled territory in Syria and Iraq.

She reserved much of her concern for the budget, however, and the possibility of a long-term continuing resolution in lieu of a National Defense Authorization Act by Congress.

"If we don't get a budget, it's going to affect lots and lots of programs," James said. "Under a CR, of course, there are no new starts." She also noted that Air Force end strength, slated to rise slightly in the 2016 budget, could not do so under a CR.

"We would be stuck in many, many ways," James acknowledged.

While "I believe" the Long-Range Strike Bomber program wouldn't be affected by a continuing resolution, James noted, "there might be as many as 50 programs, many of them smaller programs ... that would fall under that category of a 'new start,' which could not be done." That, in turn, would further retard Air Force modernization, postponed numerous times since the mid-1990s.

Welsh noted that quantity increases planned in certain programs—such as the KC-46 tanker and F-35 strike fighter—"would go away" under a CR. Multiyear programs, too, would be hit. In multiyear programs, the service negotiates a better deal for items by committing to buy a larger number, over a longer period of time than the typical two-year budget process of Congress. The efficiency of those programs would suffer.

In fact, James said, "a full-year CR would provide for our Air Force ... even less money than the sequestration-level budget would provide. So all around, that would be a bad deal, and we need to get the full-up appropriation and the full-up authorization passed at roughly the President's budget level." She called on Congress to invest in the Air Force, permanently lift the sequester, and pass a defense bill at the President's budget level. It would give "some reasonable degree of predictability, flexibility, and stability that we need in order to efficiently answer the nation's call."

## PRECISELY ISIS

The fight against ISIS continues to be the Air Force's biggest effort, James reported. At the one-year anniversary of Operation Inherent Resolve, "our airmen have executed nearly 70 percent of the strikes against the [Islamic fundamentalist group]. We've flown more than 48,000 sorties ... and we've made good progress on our strategy of 'deny, disrupt,' ultimately looking towards 'defeat'" of ISIS.

"Thanks to airpower," she said, "we've completely disrupted their tactics, techniques, and procedures. And in my opinion, had it not been for airpower, [ISIS] might well have overrun an even larger swath of Iraqi territory and made even greater gains in Syria than was the case."

James said, "We have pushed them back," claiming that the coalition fighting ISIS has halted the enemy's progress or "eliminated" its presence "in roughly 25 to 30 percent of populated areas in Iraq compared to a year ago" and has denied the group an "ability to operate freely in those areas." Airpower has "killed thousands of enemy fighters," destroyed command and control and logistics facilities, and attacked oil refineries controlled by ISIS, helping to cut off its sources of revenue.

And, James said, "we've also delivered important humanitarian relief to besieged populations" under assault by the group.

While doing all this, USAF has achieved an unprecedented level of precision, James said, minimizing "the loss of innocent life" even though it is fighting an enemy "that wraps itself around the civilian populations [and that thinks] nothing of killing anyone who is not them."

USAF pilots often return from anti-ISIS missions with unexpended ordnance if there's any question about whether hitting a target could put noncombatants in peril, said Welsh.

"We're not at war with Iraq," he said. "We don't want to drop bombs indiscriminately in Iraq and injure the citizens and destroy the property of the Iraqi people and Iraqi government," so USAF goes through "our collateral damage estimate to make sure that we're not going to hurt anyone other than the intended target." Sometimes aircraft take off with a planned objective, trying to hit something fleeting, and are able to shift to a new location en route—a process called "dynamic targeting." If the confirmation of the target doesn't come through before it's time to release weapons, though, "we bring the ordnance home. We try it again the next sortie."

"Coalition airmen have been remarkably disciplined about the way they have executed this, and we're very, very proud of their effort," Welsh stated.

## IVAN, MEET THE RAPTOR

In late August, four F-22s from the 95th Fighter Squadron at Tyndall AFB, Fla., deployed to Spangdahlem AB, Germany, to help reassure allies and enhance NATO training

for air supremacy. It is the first European deployment for the F-22.

The deployment will "demonstrate our commitments to [the] security and stability of Europe," James said. Russia's "activity in ... Ukraine continues to be of great concern to us," she said, and "our approach to Russia needs to be strong and ... balanced."

The F-22 move "is just a continuation of deploying it everywhere we can to train with our partners," Welsh added. It was to be sent "into facilities that we would potentially use in a conflict in Europe, ... like the bases where we do aviation detachments [and] ... air policing missions," including the Baltic states that border Russia. Welsh said USAF wanted to accomplish some air-to-air training with NATO allies who fly the Eurofighter Typhoon, and practice operating the F-22 "side by side with them ... in multiple-type [aircraft] scenarios."

Closer to home, Welsh said he expects the new F-35 fighter will achieve initial operational capability at Hill AFB, Utah, next year. Though the service has openly worried that it won't have enough maintainers available to flesh out F-35 squadrons unless the A-10 retires (as USAF has requested but Congress has so far refused), Welsh said, "We have enough airmen identified and in training to make the IOC date," slated for August 2016. "The IOC date has never been a concern for the maintenance side of the house. It's full operational capability that's the problem," he said.

"Unless we either get a plus-up of our topline of people in the Air Force or we divest some other platform to take maintenance folks from, we don't have enough people" for a fully manned F-35 maintenance force, said Welsh.

James insisted that "we have to be able to move on in terms of our capability and to modernize the Air Force." If there were "billions and billions and billions of additional dollars" available, she said, "we would love to [keep] the A-10. We would love to have thousands of additional airmen. ... But in a budget-constrained environment, this is one of the tough choices that we had to make for the sake of moving forward and modernizing."

Welsh also said he considered an upcoming Pentagon test pitting the F-35 against the A-10 in a close air support evaluation "a silly exercise." The F-35 will be able to perform CAS in a densely defended area, something the A-10 can't do, he insisted. At the same time, the F-35 won't be able to deliver the sheer firepower of the A-10 in an uncontested airspace. They're not competitors.

Welsh said, "Eventually, I would ... like to have a capability that replaces the A-10" in the "low-threat" environment "in an even better way than the A-10." The Air Force "should be trying to get better," he said. "I'm worried about future CAS, not past CAS."

## SEVEN REMAIN

Although there are still "seven career specialties," mostly in special operations, that are still off-limits to female airmen, USAF has been working to try to open all its career paths to women, James said.

"We ... are the most open ... of all the services" to women doing the most kinds of jobs, James said, and "we have been working on establishing gender-neutral and operationally and occupationally relevant standards" for all specialties. "Once we have them in place, it certainly would be my anticipation" that even those last seven billets would be open to all, she said.

Though she and Welsh have not yet "received recommendations from the field," regarding those standards, James said USAF has until the beginning of this month to forward a report to the Secretary of Defense on how it will proceed.

The standards are "hard," she said, and "we don't want to lower standards."

## NOT EVEN REMOTELY THERE YET

The Air Force has been struggling with the demands on its remotely piloted aircraft career field for several years. It's gotten some temporary relief from fielding as many RPA combat air patrols by way of a Defense Department move shifting some of the burden to the other services. During the respite, USAF will increase its manning levels and build a greater throughput at RPA operator school, Welsh said.

Among the methods USAF is employing to relieve pressure on its RPA cadre is to have contractors operate some of the Air Force's RPAs, Welsh said, quickly noting that this is "not a new concept."

"It does not require new approvals," he said of the plan. "We don't anticipate at all that [contractors] would be involved in ... [direct] targeting ... forces on the ground." Rather, the contractors would be performing intelligence, surveillance, and reconnaissance missions "for the near term until we can get our training pipeline mature enough that it can sustain the load over time." Stopgap measures to meet USAF's RPA demands so far have included new bonuses to keep experienced RPA operators in uniform and involuntary extensions of some manned aircraft pilots temporarily assigned to RPA duties.

Welsh vigorously argued, however, that now is not the time to revisit the debate over whether USAF should be the Pentagon's executive agent in charge of coordinating and planning the RPA efforts of all the services.

"I don't think the ... debate would be helpful or really particularly useful right now," Welsh said. The last time the issue came up, in 2008, it was "contentious" and "divisive" and settled nothing, he said.

"I don't think the debate would be much different right now than it was then," he observed, suggesting that he doesn't think the outcome would be any different either.

"We have worked very closely together as uniformed services to put an architecture in place" that coordinates the training of analysts and specialists from different services "so that we can operate in a joint way on a battlefield, and we've been doing it remarkably well for the last 12 years or so," Welsh said. "I think we've made some tremendous progress," he said, but he sees little benefit to reopening the old intraservice fault lines.

"There's enough going on. That's my personal opinion," he said.

## SPACE LINES OF CONTROL

The Air Force is the executive agent for space, however, and Welsh said USAF is working with other services and defense and national security agencies to develop new ways to characterize and respond to acts of war that take place in space.

"We are trying to help—through Air Force Space Command—put together the command and control architecture that you would use to bring together the greater Intelligence Community and the greater space community to be able to respond appropriately, as a nation, if space became a battlespace," Welsh said. Issues being discussed include: "How do you keep systems resilient? How do you keep systems operating? How do you develop redundancy? How do you develop alternative paths for data, communications, intelligence, etc.?" Those questions have to be answered "not just as a single service or even as a single warfighting command" but as a community, he said.

"All the pieces are there," Welsh asserted. "We just have to figure out how to fit them together and make sure the authorities are clear, and that's going to be the difficult part of this." ✪

# Air Force World

**A Grassroots Fix to the RPA Problem**

Air Combat Command recently launched the Culture and Process Improvement Program, meant to address stress on airmen and families within the remotely piloted aircraft community, officials announced Aug. 31.

To help pinpoint such concerns, the command sent 3,366 surveys to officers and enlisted airmen throughout the MQ-1 and MQ-9 career fields. Beginning Sept. 8, two CPIP teams were to visit 12 Active Duty, Air National Guard, and Reserve locations to conduct meetings and build on what is gathered from the survey process.

"We're seeing problems in the MQ-1/9 community at both the major command and base levels that can be solved quickly," said Col. Troy Jackson, C2ISR operations division chief and CPIP officer in charge. "Airmen in this career field are being exhausted with no end in sight; we


***F-22 Raptors from Tyndall AFB, Fla., and A-10s from Whiteman AFB, Mo., fly in formation over Amari AB, Estonia. USAF has deployed airmen, aircraft, and support equipment to Europe to conduct air training with aircraft based on the continent in an ongoing reassurance effort to NATO allies in Eastern Europe.***

want to fix this." The program is based on Air Force Global Strike Command's Force Improvement Program. It takes a grassroots approach to identifying and solving problems.

**Air Force Adds Civil Air Patrol to Total Force**

The Civil Air Patrol is now included in the Total Force when conducting missions for the Air Force as the official auxiliary, the Air Force announced. The service expanded the descriptions of the Total Force in the updated Doctrine Volume 2, "Leadership," in August.

Members of the auxiliary should be referred to as airmen during the performance of their official duties, and leaders should consider CAP along with the other parts of the Total Force when planning the best way to complete the mission.

CAP has about 57,000 volunteers and 550 aircraft, and members fly nearly 100,000 hours each year for a wide range of missions.

USAF photo by TSgt. Jason Robertson

ULA photo

***A Puff of Smoke:*** *A United Launch Alliance Atlas V rocket launches a Mobile User Objective System satellite from Cape Canaveral AFS, Fla., on Sept. 2. MUOS is a military satellite designed to improve communication between mobile US forces.*

**Building an F-35 Maintenance Force**

The Air Force has enough maintainers in place to meet the initial operational capability deadline for the F-35 by moving A-10s to backup status, transferring some Active Duty maintainers out of associate units, contracting one maintenance unit, and converting some airmen to the F-35 from the F-16, USAF spokeswoman Ann Stefanek said.

The Air Force had said it would not have enough airmen to meet the IOC date of August 2016 if it could not proceed with its plan to retire the A-10, but after Congress blocked the bulk of that move, the service was able to move 18 A-10s to backup inventory status, freeing up some maintainers, Stefanek said.

To add more, USAF moved some Active Duty airmen from associate units with the Guard and Reserve, along with contracting out the 62nd Aircraft Maintenance Unit at Luke AFB, Ariz., and converted F-16 maintainers at Hill AFB, Utah, earlier than planned. The Air Force plans to meet IOC with the units at Hill. (See "Hill Gets First F-35s.")

**New Four-Star Positions**

Gen. David L. Goldfein officially became the 38th Air Force vice chief of staff Aug. 6 during a ceremony at JB

## Hill Gets First F-35s

The first F-35A Lightning IIs assigned to Hill AFB, Utah, touched down at the base Sept. 2. Airframes AF-77 and AF-78 are assigned to the 388th Fighter Wing and Air Force Reserve Command associate 419th FW.

Hill is slated to receive 72 F-35As by 2019, becoming the Air Force's first combat-coded Lightning II unit when the jets reach initial operational capability, targeted for the latter part of next year.

Hill is the fifth Air Force and 10th overall base to receive the strike fighter. It activated the 34th Fighter Squadron as its first dedicated F-35A squadron earlier this summer and plans to have at least 15 aircraft there by next summer.

## By the Numbers

# 1,422

Number of Air Force units eligible for the Global War on Terrorism service streamer. The units are now authorized to add the streamer to their unit colors in recognition of direct support of combat operation since 2001. Home units, rather than expeditionary units, can retain their campaign streamers, the Air Force announced Sept. 1. Units are eligible for deployments to Afghanistan and Iraq, home-station missions such as Operation Noble Eagle, or direct combat support, such as remotely piloted aircraft operations.

Anacostia-Bolling, D.C. Goldfein, who previously served as director of the Joint Staff at the Pentagon, also was promoted to four-star rank at the ceremony.

Goldfein took over the role as the service's No. 2 uniformed officer from Gen. Larry O. Spencer, who retired after nearly 44 years of uniformed service and now serves as president of the Air Force Association.

Gen. Darren W. McDew assumed command of US Transportation Command from Air Force Gen. Paul J. Selva during an Aug. 26 ceremony at Scott AFB, Ill.

Defense Secretary Ashton B. Carter officiated at the change of command, saying McDew is one of the "most accomplished military leaders" who will now oversee a "vital command."

Selva is now the vice chairman of the Joint Chiefs of Staff.

The new head of Air Mobility Command, Gen. Carlton D. Everhart II, assumed command of AMC during an Aug. 11 ceremony at Scott.

**USAF Opens SAR Services to Civilians**

The Air Force has extended more sexual assault prevention and response services to civilians, service Secretary Deborah Lee James said Aug. 24.

Previously, only civilian employees stationed outside of the United States and service members had access to sexual assault response coordinators, and civilians could only file unrestricted reports. Now, civilians can get crisis intervention and advocacy services from SARCs and victim advocates 24 hours a day, seven days a week, no matter where they are stationed, according to an Air Force news release.

SARCs and victim advocates can help call the right law enforcement agency if a victim chooses to file an unrestricted report, and can help find off-base support services, if necessary. DOD approved the change for one year to assess whether to make it permanent. Civilians who work for other services will not be affected. Air Force civilians still cannot

## DOD To Increase RPA patrols

Pentagon officials are finalizing a plan for a 50 percent increase in remotely piloted aircraft missions in just four years. This will tap the Army, special operations forces, and contractors to pick up more sorties while the Air Force tries to beef up the number of its RPA personnel.

Recently authorized to drop down to 60 combat air patrols with its RPA fleet, the Air Force maintained a continuous presence of 65 CAPs just last year. The reduction resulted from USAF seeking some temporary relief for the undermanned and heavily tasked RPA community, as the service attempts to stabilize retention, training, and manning in that sector.

The Pentagon said Aug. 17 it would increase the total number of patrols to 90 by 2019. Defense Department spokesman Army Lt. Col. Joe Sowers said the Army will fly between 10 to 20 CAPs with its MQ-1C Gray Eagle fleet, US Special Operations Command will fly no more than 10 CAPs, and government-owned, contractor-operated aircraft will fly about 10 CAPs under the plan. Contractor aircraft will fly only intelligence, surveillance, and reconnaissance sorties.

USAF photo by TSgt. Joseph Swafford

***Electric Boogaloo:*** ***TSgt. John Rorie runs a postflight inspection on an EC-130H Compass Call at Bagram Airfield, Afghanistan. The EC-130 is an electronic warfare aircraft whose airmen operate offensive counterinformation and electronic-attack equipment.***

USAF photo by Joshua Swanson

***No Light in the Night:*** *A C-17 from JB Lewis-McChord, Wash., rests on the ice at Pegasus Airfield near McMurdo Station, Antarctica, for Operation Deep Freeze. Resupplying McMurdo was limited to the six months of the year that Antarctica had sunlight, but night vision capabilities now mean pilots are able to successfully navigate to and land safely on the runway even in pitch darkness.*

receive legal and nonemergency medical services, which are restricted by law.

**Starter-Generator Failure Caused Reaper Crash**

A starter-generator failure caused the crash of an MQ-9A Reaper in February in the US Africa Command area of operations, according to an investigation report released Aug. 19.

The aircraft belonged to the 432nd Wing at Creech AFB, Nev., but was assigned to the 435th Air Expeditionary Wing, when it crashed. It took off at 5:30 a.m. Zulu on Feb. 4 and flew normally for about three hours before the generator exhaust fan began to malfunction and the starter-generator failed.

The crew tried to fly the aircraft back to base and turned off equipment to maximize battery life, but the starter-generator failed again and could not be restarted. Instead, they programmed the Reaper to return to base. A second crew took control of the RPA around 10:30 a.m. and saw the battery power was very low. The crew put the Reaper in a holding pattern, but the battery power was so low the aircraft could have become unstable, so the joint force air component commander ordered the crew to crash it into international waters, states the report.

**Red Flag Falcon Fumble at Nellis**

A pair of Air Force Reserve Command F-16s from NAS-JRB Fort Worth, Texas, collided just after touching down on the runway at Nellis AFB, Nev., on Aug. 15, according to Nellis officials.

The 301st Fighter Wing pilots were flying a local familiarization sortie ahead of Exercise Red Flag 15-4, a base spokesman said.

The pilots were taken to a hospital for medical evaluation. The officials are convening an accident investigation board to probe the mishap.

**Pegasus Planning at Air Mobility Command**

USAF built plans around the delivery of 18 Boeing-built KC-46 tankers by 2017, so any significant delays in fielding the Pegasus would have cascading effects, said US Transportation Command boss Gen. Darren W. McDew, in an interview with *Air Force Magazine.* He was at the time commander of Air Mobility Command.

Many airmen assignments will be affected when KC-46s enter the inventory to replace old KC-135s. There are "real people at the end of that," he said. Similarly, military construction work, test activities, and training regimes are

## Index to Advertisers


Boeing....Cover II
Excelis....Cover III
Raytheon....3
Metlife....55
USAA....Cover IV
USAFA Association of Graduates....7

AFA Corporate Members....3
AFA Hangar Store....75
AFA Holiday Cards....47-48
AFA Member Benefits Reference....71
AFA Membership....75
AFA Planned Giving....73
Airpower Classics Book....7
Combined Federal Campaign....69
Long Term Care....73

## The War on Terrorism

### Casualties

By Sept. 16, six Americans had died in Operation Freedom's Sentinel in Afghanistan, and seven Americans had died in Operation Inherent Resolve in Iraq and Syria.

The total includes 12 troops and one Department of Defense civilian. Of these deaths, five were killed in action with the enemy while eight died in noncombat incidents.

There have been 52 troops wounded in action during OFS/OIR.

### Afghanistan To Increase Defense Spending

Afghanistan's defense spending grew by more than 18 percent over the past four years, with further increases expected as the number of International Security Assistance Force troops decrease, according to a new independent report.

Afghanistan's defense spending grew from $0.9 billion in 2011 to $1.8 billion in 2015, and in 2020 is expected to reach $3.4 billion, 11.6 percent of the country's gross domestic product, according to the report by the British think tank Strategic Defense Intelligence.

The money—used to reconstruct the country's entire military—focuses on countering threats from the Taliban and illegal drug traders, according to the report. While historically the country has focused on outfitting its military through deals negotiated by NATO, since 2014 Afghanistan has been able to buy from foreign defense manufacturers through government-to-government deals.

### RPAs and the Hunt for ISIS

The 432nd Wing at Creech AFB, Nev., has played a critical role in the air campaign against ISIS forces, according to an operations update.

Several wing officials, speaking on background about the role the unit's remotely piloted aircraft have played in the campaign since August 2014, note the initial phase of Operation Inherent Resolve focused on ISR gathering, then grew into proactive support of real-time operations.

Wing aircrews and assets have contributed some 4,300 sorties and employed some 1,000 weapons on targets. As of Aug. 7, a total of 10,684 targets have been struck in OIR.

RPA operators use multiple avenues of communications to integrate with other in-theater assets. For example, some 400 "buddy lase" events—where RPAs use a combat laser to guide weapons on target, while another aircraft releases the weapons—were carried out by MQ-1 Predator and MQ-9 Reaper aircrews.

### Staying Ready for ISIS

The US has been battling ISIS terrorists through Operation Inherent Resolve for a year now, and Gen. Darren W. McDew, the commander of US Transportation Command, said he does not anticipate this fight ending anytime soon.

ISIS represents a "generational threat," McDew said in an interview with *Air Force Magazine.* The nation might be involved in this particular fight "for a decade or more." He said the mobility community has worked ISIS-related demands into its overall operational structure because of the global nature of Air Mobility Command, which he previously led.

"There's not an operation" going on anywhere in the world that AMC does not touch, he stated, and the command has the capacity to handle today's demands and the occasional surge of additional activity.

### Afghans Have Persistent Gap in CAS, Air Support

Afghan forces still have a "capability gap" in aviation and close air support capabilities and will require continued US assistance over the next few years, Army Brig. Gen. Wilson A. Shoffner, deputy chief of staff for communication for NATO's Resolute Support mission, said at an Aug. 13 Pentagon briefing.

While Afghan forces have held their own in battles this year, they have been much less effective when they do not coordinate with air and fire support, Shoffner said. While US and coalition activity has decreased, Afghan forces have been actively engaged against Taliban and other insurgent forces, seeing 46 percent more casualties this year compared to last.

This comes as the Afghan troops are carrying their biggest share of the war, with total coalition forces at 10 percent the amount that was there three years ago, Shoffner said.

all set up with the expectation that KC-46s will be available at the predicted times in the predicted quantities.

McDew called the KC-46 "vital" to AMC and the No. 1 modernization priority for the command. He said he is "a bit concerned" about Boeing's progress along the schedule, but his bigger concern is what would happen if sequestration were to return. Officials have called stable and predictable funding essential to the health of the KC-46 program.

### Spang F-16 Crashes in Germany, Pilot Safe

An Air Force F-16 pilot was safe after ejecting during a training flight the morning of Aug. 11 over the Bavaria region of Germany, according to 52nd Fighter Wing officials.

The pilot, assigned to the 480th Fighter Squadron at Spangdahlem AB, Germany, ejected around 9:38 a.m. local time near Engelmannreuth, Germany, while on a training flight to a range near US Army Garrison Bavaria in Grafenwoehr, Germany, according to the officials.

The pilot, who experienced nonserious injuries and underwent treatment at a local German hospital shortly after the incident, jettisoned his fuel tanks over an unpopulated area before ejecting. The F-16 was not carrying live ordnance, but was flying with six 25-pound, inert training munitions at the time of the crash.

The 52nd Fighter Wing at Spangdahlem canceled flying operations for 24 hours following the mishap. The crash is under investigation.

### ACC Unveils 2015 Strategic Plan

Air Combat Command boss Gen. Herbert J. "Hawk" Carlisle unveiled ACC's newest command strategy Aug. 10, entitled "Securing the High Ground." It lays out how ACC will modernize and transform the US Air Force combat forces to better meet 21st century threats and challenges.

The document outlines Carlisle's priorities for his tenure as ACC commander, he said in statement, and will provide a "roadmap to ensure the Combat Air Force can provide unmatched air dominance for our nation now and into the foreseeable future."

As it prepares the force for future fights, it must invest

and continue to refine practices such as live, virtual, and constructive training, which joins up live-fly events with computer simulations, and to invest in science and technology research, because it could generate leap-forward capabilities and concepts, the strategy states.

**Rivet Joint Fire Findings**

During initial takeoff from Offutt AFB, Neb., on April 30, a leak in the high-pressure oxygen system in the rear cabin of an RC-135V Rivet Joint assigned to the 343rd Reconnaissance Squadron, led to a fire that burned a hole through the aircraft's upper fuselage, according to an Air Force investigation.

The pilot aborted the mission and evacuated the aircraft as fire crews arrived. The fire occurred during a training mission and burned through the rear galley area of the aircraft, damaging both the aircraft's structure and its control and mission systems. Repair costs are estimated at $62.4 million, according to the accident investigation board findings.

Depot maintenance personnel from L3 Communications failed to properly tighten a retaining nut connecting a metal oxygen tube to a fitting above the galley, causing the oxygen leak. This led to a "highly flammable oxygen-rich environment that ignited." The fire then melted the retaining nut, leading the tubing to detach. This fed more oxygen into the fire, causing "severe damage" to the galley area. Four crew members received treatment for minor smoke inhalation.

**New Boss at 14th Air Force**

Lt. Gen. David J. Buck took command of Air Force Space Command's 14th Air Force (Air Forces Strategic), and the Joint Functional Component for space, US Strategic Command, at Vandenberg AFB, Calif., on Aug. 14, according to a news release. Buck assumed command from Lt. Gen. John W. "Jay" Raymond, who is the Air Force's new deputy chief of staff for operations.

***Look Out Below:*** ***An Alaska ANG C-17 drops a Humvee fitted with a parachute over JB Elmendorf-Richardson, Alaska, during Pacific Airlift Rally. Pacific Air Forces hosts the biennial military aircraft symposium for nations in the Indo-Asia-Pacific region. PAR uses a humanitarian disaster relief scenario to train participating nations in interoperability and to advance airlift issues specific to the region.***

## SASC Leaders Blast LRS-B Estimate Errors

The chairman and ranking member of the Senate Armed Services Committee have requested a series of reports and assessments from the Air Force on the cost estimates and projections regarding the Long-Range Strike Bomber (LRS-B), following the revision of a recent DOD report on the program's long-term cost.

In an Aug. 26 letter to Defense Secretary Ashton B. Carter, SASC Chair Sen. John McCain (R-Ariz.) and Sen. Jack Reed (D-R.I.) criticized DOD for "significant errors" in the program's long-term cost estimates, given to Congress as part of an annual report.

The report details the Pentagon's 10-year nuclear weapons spending and listed the 10-year estimate for the LRS-B program as $58.4 billion, a figure USAF leadership has since said was in error. The service revised that number down to $41.7 billion, noting it includes research and development, test, operation, and support, but not overhead.

The letter also requests amended reports for the congressional defense committees, with corrected information, detailed accounting of the elements used to estimate the 10-year projections, an explanation for the decrease, and how the corrected costs were calculated, among other assessments of the program.

**JSTARS Successor Finalists Picked**

Boeing, Lockheed Martin, and Northrop Grumman are the finalists in the hunt to replace the E-8C Joint Surveillance

USAF photo by SSgt. Edward Eagerton


USAF photo by A1C Stormy Archer

***Let Me Educate You:*** *2nd Lt. Duston O'Brien, a 435th Fighter Training Squadron upgrade pilot, readies for takeoff in a T-38C Talon at JBSA-Randolph, Texas, on Sept. 3. The 435th FTS trains some 150 students each year from the US, Iraq, Japan, Poland, Saudi Arabia, and Singapore.*

Target Attack Radar System (JSTARS), the Air Force announced Aug. 7. Boeing received a $9.95 million contract, while Lockheed Martin received $11.5 million, and Northrop Grumman received a $10 million award, all identically worded.

They will pursue "pre-engineering and manufacturing development efforts" on the recapitalization project, assessing technology maturity, to "reduce system integration risk and lower life cycle cost by virtue of design." USAF said it received four offers and picked three.

An Air Force official said the contractors will conduct a full system review and a preliminary design review and build subsystem prototype demonstrators. The contracts were to be followed in early September by a Milestone A review by Pentagon acquisition, technology, and logistics chief Frank Kendall. In mid-July, USAF acquisition chief William A. LaPlante said there could be a contract award within three years. The Air Force wants to reach initial operational capability with a replacement system in 2023.

## Senior Staff Changes

**RETIREMENTS:** Brig. Gen. John W. **Doucette,** Brig. Gen. Thomas F. **Gould,** Lt. Gen. Stephen L. **Hoog,** Brig. Gen. Charles K. **Hyde,** Maj. Gen. Michael A. **Keltz,** Brig. Gen. Jeffrey R. **McDaniels,** Maj. Gen. H. D. **Polumbo Jr.,** Lt. Gen. Mark F. **Ramsay,** Gen. Larry O. **Spencer,** Maj. Gen. Michael S. **Stough,** Brig. Gen. Kenneth E. **Todorov.**

**CHANGE:** Maj. Gen. John M. **Hicks,** from Dir., Ops., SOCOM, MacDill AFB, Fla., to C/S, SOCOM, MacDill AFB, Fla.

**COMMAND CHIEF MASTER SERGEANT RETIREMENT:** CMSgt. Terry B. **West.**

**CCMS CHANGES:** CMSgt. Todd S. **Petzel,** from Chief, AF Chief Master Sergeant Office, DCS, Manpower, Personnel, & Svcs., Pentagon, to Command Chief, 18th AF, AMC, Scott AFB, Ill. … CMSgt. Christopher **Vanburger,** from Supt., AFOSI, 6th Field Investigations Regions, IG of the AF, OSAF, JB Pearl Harbor-Hickam, Hawaii, to Command Chief, AFOSI, IG of the AF, OSAF, Quantico, Va. … CMSgt. Calvin D. **Williams,** from Chief, AF Enlisted Total Force Integration, DCS, Manpower, Personnel, & Svcs., USAF, Pentagon, to Command Chief, AFGSC, Barksdale AFB, La. … CMSgt. Larry C. **Williams Jr.,** from Command Chief, 515th Air Mobility Ops. Wg., AMC, JB Pearl Harbor-Hickam, Hawaii, to Command Chief, USAF Expeditionary Center, AMC, JB McGuire-Dix-Lakehurst, N.J.

**SENIOR EXECUTIVE SERVICE CHANGES:** John H. **Bonapart Jr.,** to Dir., Log., Engineering, & Force Protection, AFSPC, Peterson AFB, Colo. … Jay W. **Fiebig,** to Dir., Engineering & Tech. Mgmt., AF Sustainment Center, AFMC, Hill AFB, Utah … David A. **Hardy,** to Asst. Dep. Under SECAF (Space), Office of the Under SECAF, Pentagon … William E. **Maclure,** to Dep. Dir., Ops. & Readiness, DCS, Ops., USAF, Pentagon … Valerie L. **Muck,** to Assoc. Dep. Asst. Secy. (Acq. Integration), Office of the Asst. SECAF (Acq.), SECAF, Pentagon … Anthony P. **Reardon,** to Asst. DCS, Strat. Plans & Rqmts., Office of the DCS, Strat. Plans & Rqmts., USAF, Pentagon … Teresa M. **Salazar,** to Vice Dir., C4/Cyber, Jt. Staff, Pentagon.

**The** Air Force is about to wrap up work on a new Bomber Roadmap, trying to reconcile evolving operating realities with extremely tight budgets. The document will likely call for a modest increase in the bomber force in the midterm, along with a robust series of upgrades and new weapons designed to give the legacy bomber fleet more capacity, connectivity, and reach.

According to senior USAF officials and outside experts, who addressed unclassified aspects of the roadmap, it follows the service's new 30-20-10 format: It provides a 30-year vision explaining the capabilities USAF must have in long-range strike circa 2045, a more structured 20-year plan focusing on deploying new capabilities, and a detailed 10-year budgetary program of near-term investments.

Underlying the plan are some new operational "givens." Chief among these is the fact that deadly air defenses are increasingly common, making it tougher for the Air Force to penetrate an ever-growing number of locations. Secondly, accurate tactical ballistic and cruise missiles, with increasingly long reach, will push Air Force staging bases farther away from an enemy's territory, putting a premium on combat aircraft with intrinsically greater range and standoff weapons.

"As we look to the future, we have to look at … the demand signal for the bomber force," said Brig. Gen. Ferdinand B. Stoss, Air Force Global Strike Command's head of strategic planning and programs. The roadmap is "a very high-level strategic conversation" about the mix and numbers of bombers "in the out-years, and because bombers … have such longevity, what's needed in the way-out years."

He said, "This is not an easy or simple study to conduct. It's extraordinarily strategic and long-ranging."

To meet its commitment to provide an attack option against any target in the world, USAF is buying 80 to 100 new Long-Range Strike Bombers, planning limited usability circa 2023 and initial operational capability by 2030. At first, these will be in addition to the B-52—the youngest of them is already 53 years old—and the B-1B, turning 30 this year. Both are expected to serve to at least 2040—and probably beyond. The B-2, the youngest of the existing fleet at 20 years old, will serve until 2058.

The USAF bomber fleet comprises some 159 airframes: 20 B-2s, 63 B-1Bs, and 76 B-52s. At any given time, a number

**Today's B-52, B-1, and B-2 fleets will be heavy hitters for years to come.**

# The Future of Lo

**By John A. Tirpak,** Editorial Director

of bombers are undergoing programmed depot maintenance, and a small number are dedicated to testing new systems, software, and weapons.

The pacing of the LRS-B's introduction to the force was still apparently unsettled in August. Air Force acquisition chief William A. LaPlante, in a July interview, said he expects USAF to buy the LRS-B fairly quickly, estimating "it's probably in the ballpark of 10, 12, 14 a year" to acquire between 80 and 100 aircraft. He said this rate would probably be most efficient, assuming a typical manufacturing learning curve. But Chief of Staff Gen. Mark A. Welsh III, speaking at an August Pentagon press conference, said that after initial deliveries in the mid-2020s, production "would probably continue for 25 years or so." A service spokesman later said, "Production planning assumes a relatively low production rate" and the LRS-B might be bought through 2050.

In other words, the Air Force may have to buy smaller and somewhat less-efficient annual lots of the new bomber to keep annual spending within realistic budget limits and to maintain a warm production line.

## TIMING OUT

During the period 2031-50, the Air Force will continue fielding the LRS-B and evolve the aircraft "as threats and technology mature," the spokesman said, adding that the exact details are classified.

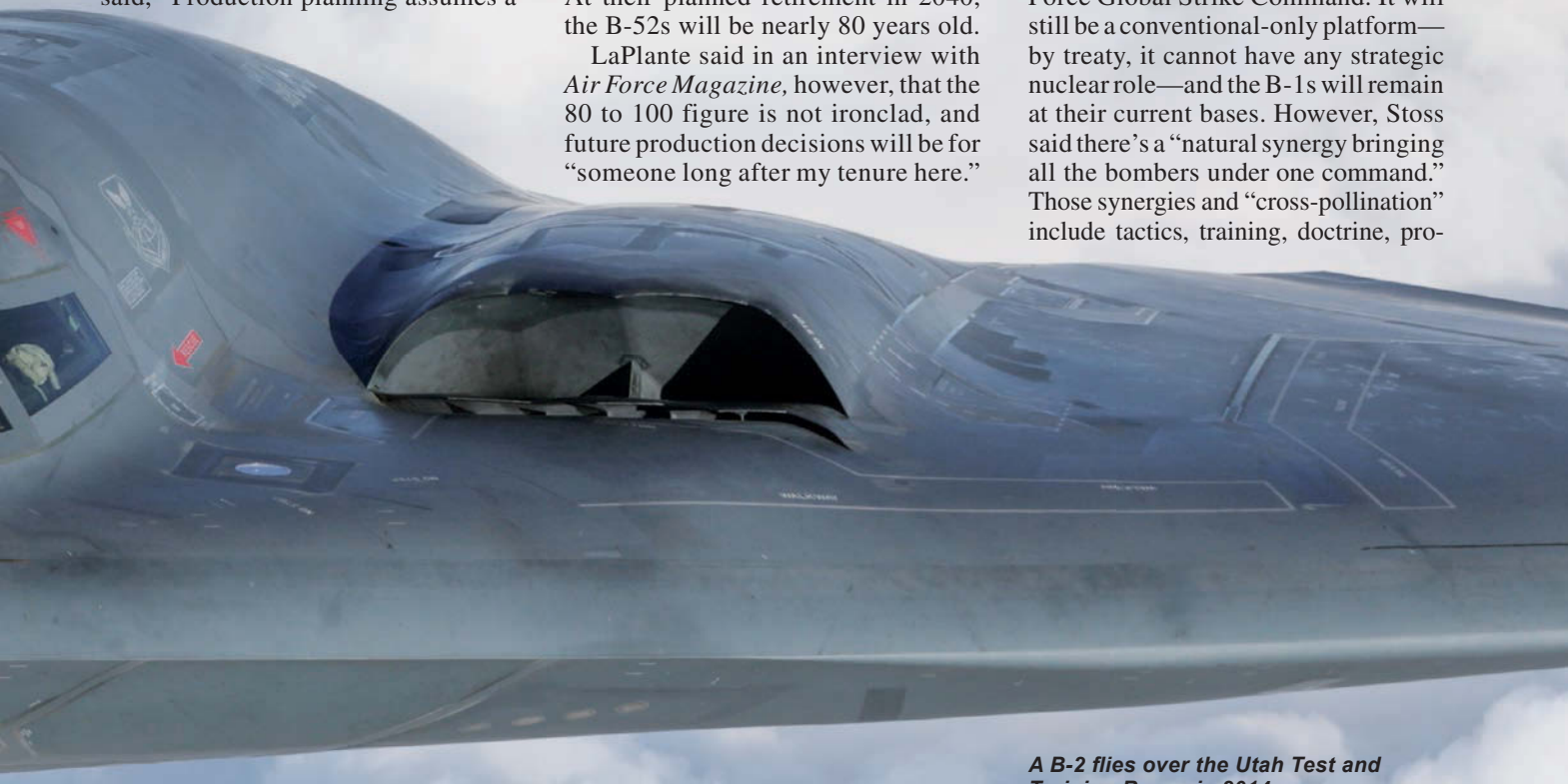
The LRS-B will "replace the B-52 and B-1," Welsh said. They will "time out, eventually." He joked that "the B-52's going to try to make [it to] 100 years, … but we really should question that." At their planned retirement in 2040, the B-52s will be nearly 80 years old.

LaPlante said in an interview with *Air Force Magazine,* however, that the 80 to 100 figure is not ironclad, and future production decisions will be for "someone long after my tenure here."

The roadmap is an in-house effort of the Air Force, according to Stoss. It's needed not just to plan numbers and upgrades, but to think through "second- and third-order implications" of the choices made. He said, "We have many agencies that are working with this" within the Air Force.

Besides AFGSC, Air Combat Command, the Air Staff, Air Force Materiel Command, and others all have roles to play in the roadmap, which will consider bomber needs within global strike, one of USAF's core competencies. Bomber capabilities will be traded against those of fighters, remotely piloted aircraft, and other assets to find the right force mix.

Big changes are already underway in the bomber world. After more than two decades as an ACC asset, the B-1 shifts this month to become part of Air Force Global Strike Command. It will still be a conventional-only platform—by treaty, it cannot have any strategic nuclear role—and the B-1s will remain at their current bases. However, Stoss said there's a "natural synergy bringing all the bombers under one command." Those synergies and "cross-pollination" include tactics, training, doctrine, pro-



*A B-2 flies over the Utah Test and Training Range in 2014.*

# ng-Range Strike

Northrop Grumman photo by Chad Slattery

**The B-52 is "like an iPhone," Stoss observed. "You can put different applications on it," and even if "something isn't exactly aerodynamic, [it's] not a big deal. The B-52 itself isn't exactly aerodynamic."**

gramming, and requirements, as well as more efficient headquarters and numbered air force functions, Stoss said, and it will also improve "aircraft modernization and acquisition." New systems designed for one bomber might be applicable across all three.

"Diversity," he said, "makes you stronger, and this is one more way to have diversity of expertise and background."

Though there have been rumors in the last few years that the B-1 fleet would be cut to save money, Stoss said, "in the short term, I think we're looking at a static" number. Right now, "there's plenty of work for all of the bomber force."

Each of the legacy bombers plays a unique role in the fleet. The B-1B was removed from the nuclear mission in the early 1990s, but can carry the largest payload and has been the conventional workhorse in Afghanistan and Iraq, serving as on-call close air support able to offer massive firepower with the response time of a fighter.

The B-2 is the only bomber able to penetrate enemy modern air defenses and conduct direct-attack missions, by virtue of its stealth design. It conducted the initial attacks in every major combat operation since Operation Allied Force in 1999, and is the Air Force's only direct-attack nuclear bomber.

## VERSATILITY

The B-52 is the other nuclear bomber, but only as a carrier of the AGM-86B Air Launched Cruise Missile, which can be fired more than 1,000 miles away from its target. In a "permissive" combat space, B-52s regularly carry a large conventional payload directly to the target, as was done many times in Iraq and Afghanistan. The B-52 is USAF's most versatile bomber, able to carry many types of munitions. The Air Force has certified the B-52 to carry, among other things, sea mines.

The ALCM keeps the B-52 in the nuclear game, Stoss said, but the missile was "designed in the 1970s, produced in the 1980s, and had a 10-year life expectancy, and now it's 30 years past that."

A critical program for AFGSC is the new Long-Range Standoff Missile (LRSO), to replace the ALCM beginning sometime in the next 10 years. Stoss declined to say whether the LRSO would employ hypersonic technology, but Air Force Research Laboratory chief Maj. Gen. Thomas J. Masiello said in June that a hypersonic standoff missile could be fielded by "the mid-2020s." He did not directly link the LRSO and the hypersonic weapon, however.

"We continue to do service life extension programs on the ALCM, but there's a point in time where you need a new capability," Stoss said, and the LRSO provides that. The B-52 and LRSO "would be an awesome combination," he added. More than that, Stoss said he couldn't "discuss methods and domain that the LRSO is going to operate in."

The B-52 is going through a series of upgrades that give it greater weapon flexibility and builds on the installation of a "digital backbone," allowing it to communicate via data links. The CONECT (Combat Network Communications Technology) upgrade provides for "rapid retargeting, rapid retasking," Stoss said, noting that the whole fleet should have the upgrade by "the 2020 timeframe."

Northrop Grumman photo by Chad Slattery

***The youngest of the fleet of bombers, the stealthy B-2. Steady upgrades preserve its ability to penetrate the most formidable defenses.***

The program, called the 1760 Internal Weapons Bay Upgrade, will let the B-52 carry all the so-called "J-Series" weapons in its internal weapons bay, according to Eric Single, chief of the Global Strike Division in LaPlante's acquisition office. These weapons include the Joint Direct Attack Munition; its laser guided variant; both the Joint Air-to-Surface Standoff Missile and its Extended Range variant, JASSM-ER; and the Miniature

Air Launched Decoy and its jamming variant, the MALD-J.

Previously, these weapons could only be carried on external pylons. Single said the weapons would be carried on internal rotary launchers, and in the future, might allow for a mixed internal as well as external load.

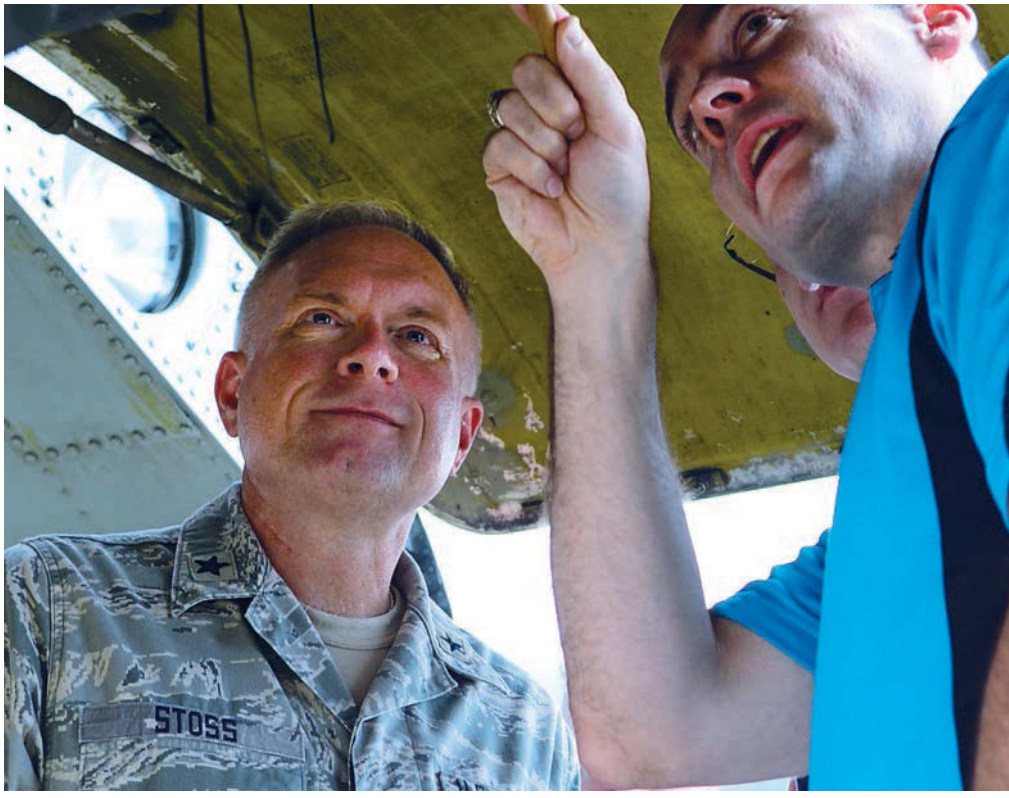
The B-52 is "like an iPhone," Stoss observed. "You can put different applications on it," and even if "something isn't exactly aerodynamic, [it's] not a big deal. The B-52 itself isn't exactly aerodynamic."

There are two big projects AFGSC would like to undertake for the venerable B-52.

One is an engine upgrade.

In June, 8th Air Force commander Maj. Gen. Richard M. Clark told a House panel

USAF photo




***Brig. Gen. Ferdinand Stoss (l) listens as Lt. Col. Aaron Franklin describes the conversion of a B-52 to a non-nuclear capable aircraft in compliance with the New START agreement. Only 40 B-52s will remain nuclear-capable under the terms of the treaty.***


USAF photo by TSgt. Jason Robertson

that a new engine for the B-52—carrying eight motors—is a "critical" requirement.

The TF-33 engines are more than 50 years old, out of production, and spare parts are getting scarce. "If the B-52 is to last another 25 years, an engine replacement would make sense because of the savings to be had on maintenance and less fuel consumption," Clark argued. Operationally, new motors would allow the BUFF to climb faster and to higher altitudes, carry more weapons, and increase its range.

Stoss said the Air Force has been in talks with industry to see what kinds of off-the-shelf commercial engines might fit the bill for the B-52.

Particularly attractive is the idea that new engines might be so reliable that they never have to come off the wing for the B-52's remaining life, offering considerable "back shop" manpower savings—in addition to as much as 35 percent better fuel efficiency, Stoss noted.

***A B-52 in an exercise near Guam. The BUFF is being tweaked to expand its weapons options and to have its communications upgraded, and Air Force Global Strike Command would like to give it new engines. Stoss says the legacy bomber inventory will remain "static" while LRS-Bs are delivered.***

However, Single said, USAF cannot afford to provide the up-front funding

**"Anybody who's worked in missile defense—anybody—knows handling a salvo [of] more than about 10 is hard, if not impossible, ... particularly when you add clutter, debris, and countermeasures. It's always easier to be [on] the offense than [on] defense," LaPlante said. "Defense against missiles is hard."**

for a massive re-engining project like this because of "other priorities that take precedence." But the service is looking at "third-party financing" and other novel approaches to come up with the cash. Another approach is a program allowing federal agencies to invest in "green" technology to make buildings more energy efficient. The agencies doing this can pay the investment costs back with the savings recouped. However, the federal program is geared to real-property assets and may not be applicable to Air Force jets.

"I'm open-minded to any idea that ... will save money," LaPlante said in July. His initial guess as to whether the green-building funding approach would work "is 'no,' but they're looking at it again."

Single said it would be a "bad assumption" that the LRS-B will replace the B-52 before the B-1B.

The LRS-B "has a different role" from the B-52, Single explained. The B-52 has a standoff role, but like the B-1, the BUFF "can be used in a permissive environment for direct attack." Also, it has the nuclear mission, unlike the B-1.

The LRSO is being designed with the B-52 in mind as the initial carrier platform, but both the B-2 and LRS-B will be able to carry it, Single said. Under the New START agreement, USAF is limited to 60 nuclear-capable bombers, including the 20 B-2s. The B-52s excess to the remaining 40 are to be "de-modded," such that they are no longer nuclear-capable and fill only a conventional role.

The B-1B is receiving "probably one of the largest mods … since it was built," Single said. Involving three different improvements to the B-1B's avionics, the omnibus program is known as the Integrated Battle System. It's so substantial that Lt. Col. Michael Williams, who leads the 419th Flight Test Squadron at Edwards AFB, Calif., said it "ought to be called the B-1C."

One element is the Central Integrated Test System, to add self-diagnostic systems to the bomber, streamlining maintenance.

Another is the Fully Integrated Data Link, or FIDL. Single explained that it provides the bomber with beyond line of sight visual communications with people on the ground—usually a forward air controller—as well as machine-to-machine targeting information. The improvement will allow the B-1B crew to see common information with the ground controller—via "something like the Rover" handheld data-sharing device—making it "a huge force multiplier" in the close air support role.

## UPGRADES AND UPDATES

The third element is the Vertical Situation Display Upgrade, providing better situational awareness for the crew with a "state-of-the-art flight instrument."

There are no other major upgrades currently in the budget for the B-1, according to Single, but that "doesn't mean there won't be any in the future." A structural study is being done on a B-1 carcass taken out of the Davis-Monthan AFB, Ariz., "Boneyard" to see just how long the B-1's service life could be extended, but Single said "it would not need any additional service life upgrades" to reach 2040. Beyond that, it "would depend on what they find out with the structural study … [and] what that final bomber flight plan comes out with."

The B-2 is going through what Northrop Grumman officials have christened a "midlife update." Computers—old 286s that were state-of-the-art three decades ago—used for flight controls, are being replaced with modern hardware, and black boxes are being replaced with circuit cards. Single, a former B-2 pilot, said the upgrade also puts in "new data buses, … new data storage, so it becomes the backbone for any kind of future B-2 avionics upgrade."

Second is the Defense System Management Modernization project to change out processors, antennas, displays, to give the pilots a very much more robust situational awareness capability. The defensive management system "will display threats as you penetrate"—cuing off the radio frequency signals from an enemy integrated air defense system—"and tells the pilots where those systems are." Stealth aircraft survive by avoiding threats. The system allows the pilots to

USAF photo by SSgt. Richard Ebensberger

***An upgraded B-1B lands at Dyess AFB, Texas. A workhorse in Afghanistan and Iraq, the B-1B will be the only non-nuclear bomber in Air Force Global Strike Command. Tests are expected to show it can serve 25 more years.***

thread their way between defenses and around pop-up threats.

On a global strike mission, even though the mission has been planned, "when you get to theater, potentially 15 hours later, [things] may have changed. There may be things the intel community has not sensed yet," said Single.

Another improvement is called Flexible Strike, a "re-hosting of the stores management system" on new computers. It increases the memory, reducing the time required to load targets into the weapons. In the future, it may be possible for the B-2 to carry a diverse load of weapons, but that upgrade is not yet funded.

Finally, the B-2 is getting a very low frequency (VLF) radio improvement. It's the same system that "the B-52 uses now," Stoss said, and the same waveform that allows the National Command Authorities to communicate with ballistic missile submarines and ICBM launch control centers.

An ongoing program, Single noted, is the Low Observables Signature and Supportability Modifications effort. It applies improvements to the B-2's stealthiness. While some of them actually reduce the B-2's radar and infrared signature, most are designed to speed up the time-consuming process of ensuring the B-2's stealth finish is in good condition. A previous effort under this program substituted an automated tape-laying system for a previously hand-applied technique to fill seams in the B-2's surface.

"It targets affordable, quick-to-field solutions, to keep the stealth characteristics maintainable [and] affordable," Single said. That's key because the B-2 fleet is so small. "The number of aircraft you have available for use at any given time is very critical," he said.

A crucial future upgrade for the B-2 will be an extremely high frequency (EHF) communications upgrade. There was to have been one in the current package of modifications, but it was terminated when the Family of Advanced Beyond Line of Sight Terminals (FAB-T) program "really became unaffordable," Single said. USAF is doing a new affordability analysis to see when EHF can be added back in.

USAF photo by Jim Varhegyi

The B-2 was the first aircraft to make large-scale use of composites in its structure and surfaces, but Single said there's no indication they won't last a long time.

The year "2058 is the expected service life right now, and that has not changed," he stated.

Is there a known time when even the B-2 will no longer be a viable penetrating asset?

"No," Single asserted, but "it depends on … the environment you're trying to penetrate." He said that for the worst-case, "incredibly complex" IADS, "we may not have anything that can get in there." But as bombers and fighters "roll back" enemy air defenses, eventually all the bombers

USAF photo by SSgt. Richard Ebensberger

***Top: Air Force acquisition chief William LaPlante, here testifying before Congress, wants longer-range standoff weapons to equip the bomber fleet, but the service needs them to come way down in price. Right: The upgraded and streamlined B-1B cockpit eliminates a tangle of wired-together laptops and other ad-hoc solutions to various connectivity and targeting problems.***

Northrop Grumman photo by Chad Slattery

USAF photo by SSgt. Vernon Young Jr.

***Top: A B-2 flies over the Utah Test and Training Range. Above: A B-52 makes a run during a Red Flag exercise at Nellis AFB, Nev. Long reach has always been USAF's singular expertise, and modern threats make it more crucial than ever. The combination of new and old bombers, new systems, and new weapons will ensure the most valuable targets remain within USAF's grasp.***

could participate in a future war with a peer adversary.

"And that's true today," he said.

By early September, the Air Force had not said much about the LRS-B's unique role in the bomber mix. Senior officials have suggested it will be considerably stealthier than the B-2, and with regular block upgrades, will be modified to take on new missions and incorporate new technologies with an "open architecture." Future upgrades will be competed and not sourced solely with the jet's original manufacturer.

Weapons will be a key element in USAF's future ability to get at any target, and as air defenses push the denied zone farther away from the target, standoff weapons will become increasingly important.

In a study released by the Center for Strategic and Budgetary Assessments in June, authors Mark Gunzinger and Bryan Clark argued that USAF is not investing in enough standoff weapons for the anticipated threat. Weapons like JASSM, JASSM-ER, and LRSO will simply be too expensive to buy in the requisite numbers, they said, and as air defenses become more lethal, the "probability of arrival" of many standoff munitions will decrease, to perhaps only 50 percent. That will demand many more standoff weapons than expected, they said, noting that USAF plans less than five percent of its munitions inventory to be standoff types.

A cost-effective way to address the situation, the CSBA study suggested, might be to extend the range of JDAM, JSOW, Small Diameter Bomb, and other systems with propulsion tail kits, not unlike the inventory improvement made by converting dumb bombs to precision weapons with the JDAM tail kit. This way, USAF could move a large portion of its existing precision munition inventory into what the authors called the "sweet spot" of standoff, in the 100-nautical mile to 400-nautical mile range.

LaPlante, asked the July interview if the CSBA study was a good approach to enhancing future long-range strike, said he agreed that "we need cheap munitions that are longer range." He thinks USAF needs more weapons able to go 1,500 miles to 2,000 miles, and 'cheap' to me means less than a million dollars a pop." That's where Tomahawk and JASSM-ER come in now.

## GLOBAL ATTACK

He was suspicious, however, of the rate of attrition of standoff weapons postulated in the study, and thinks it won't be that hard to get missiles to their targets.

"Anybody who's worked in missile defense—anybody—knows handling a salvo [of] more than about 10 is hard, if not impossible, … particularly when you add clutter, debris, and countermeasures. It's always easier to be [on] the offense than on defense," LaPlante said. "Defense against missiles is hard."

According to various estimates, the Air Force plans to spend more than $50 billion on enhancing its bomber fleet over the next decade. The service said $41.7 billion of that will be on the Long-Range Strike Bomber alone. However, global attack is the Air Force's second-most important core competency, after air and space superiority. Given limited expected funding and the worsening threat, the service's decision to keep flying its old iron seems the best way to hedge its bets. ✪

# Verbatim

verbatim@afa.org

**By Robert S. Dudney**

**Iran, Anyone?**

"The stealth and other advanced capabilities provided by this fifth generation [F-35] fighter are self-evident. Your options for attacking the enemy are much more numerous and practical. The things that we could do before will entail much less risk, and the things we might not have been able to do before will be rendered doable. It changes the psychology of the arena by allowing you to hit the enemy without him being able to stop you. ... It really is a game-changer and the enemy knows that."***—Major E. [full name withheld], an Israeli air force pilot selected to fly the F-35, defensenews.com, Sept. 5.***

**The Big Upgrade?**

"After a thorough review of data that was not available previously, ... we have concluded that this is one [recipient of an Air Force Cross] that is worthy of a relook for a potential Medal of Honor. We've looked at [six other airmen]; we think we have one. We've requested a representative [in Congress] to support that ... and we're going to try to move that one forward."***—Lt. Gen. Bradley A. Heithold, head of Air Force Special Operations Command, commenting on possible award of a Medal of Honor to an unidentified airman,*** **Air Force Times,** ***Aug. 31.***

**Days of Future CAS**

"The F-35's mission in the close air support arena will be to do high-threat close air support in a contested environment that the A-10 will not be able to survive in. That will be the role of the F-35, and it will not be able to do that until it's fully mission capable in our full operational capability at 2021 and beyond. So the idea that the F-35 is going to walk in the door next year [at] IOC and take over for the A-10 is just silly. It's never been our intent and we have never said that. And so that's not a plan. I would eventually—certainly like to have a capability that replaces the A-10 that does the low-threat CAS work in an even better way than the A-10 has been able to. I mean, we should be trying to get better as an Air Force. I'm worried about future CAS, not past CAS."***—Gen. Mark A. Welsh III, USAF Chief of Staff, Pentagon press briefing, Aug. 24.***

**Connecting the Dots**

"A foreign spy agency now has the ability to cross-check who has a security clearance—via the OPM [Office of Personnel Management] breach—with who was cheating on their wife—via the Ashley Madison breach—and thus identify someone to target for blackmail."***—Peter W. Singer, coauthor of*** **Cybersecurity and Cyberwar, Los Angeles Times,** ***Aug. 31.***

**Airman Stone's Question**

"Airman Stone, in the aisle seat, took off at a sprint toward the gunman, his two friends behind him. 'It felt like it took forever to get to him,' Airman Stone recalled. He could not figure out why he had not been shot yet. He said he kept expecting to feel a bullet rip into his torso. 'He's about to shoot me,' he thought as the gunman ... pointed the rifle at him. 'Why am I not dead yet?'"***—Excerpt from account of A1C Spencer Stone's rush to reach and subdue a terrorist aboard a French train, saving dozens of passengers,*** **New York Times,** ***Sept. 2.***

**BUFFs and BONEs**

"Whether it's B-52 or B-1, we know Israel's military would need to expand its infrastructure. There are real questions about long-term life cycle costs of a long-range bomber and whether that's an investment Israel wants to make. But if Israel requests it [approval to acquire USAF long-rang bombers], I'd be favorably disposed."***—Sen. Tom Cotton (R-Ark.), chairman of Senate Armed Services AirLand subcommittee, defensenews.com, Sept. 2.***

**McCain, Tanker: Together Again**

"Delays to the [KC-46A tanker] program's internal deadlines for completing key qualification and planned ground and flight testing activities are indicative of a program at risk of not meeting its planned delivery milestones. ... All too often under our current defense acquisition system, the [Defense] Department has started programs that were poorly conceived or inherently unexecutable, with the aim of getting programs into development and production where they can become notoriously difficult to change meaningfully or, if necessary, terminate. The KC-46A program must not become another such failure."***—Sen. John McCain (R-Ariz.), official statement on the tanker program, Aug. 31.***

**Owning the Ayatollahs**

"So [President Obama's US-Iran nuclear] deal will proceed, and Democrats had better hope it succeeds, because they are taking responsibility for Iran's compliance and imperial ambitions. Politically speaking, they now own the Ayatollahs. The Democratic co-owners include Vice President Joe Biden, presidential front-runner Hillary Clinton, and nearly every member of the congressional leadership. ... The Iran deal is one of those watershed foreign policy moments when history will remember where politicians stood. Mr. Obama has said as much by conceding that if Iran gets a nuclear weapon, 'it's my name on this.' By forming a partisan phalanx to let Mr. Obama overcome bipartisan opposition, Democrats have also put their names on it."**—Wall Street Journal** ***house editorial, Sept. 2.***

**Profit and Loss**

"We should stop thinking about our people as a cost center but rather as a profit center. They're not an expense, they're an investment. ... It's harder than ever before to maintain a lasting technological superiority over our adversaries. But the thing that has always made us great and will continue to make us great is our people. ... That will be our lasting competitive advantage."***—Brad R. Carson, acting undersecretary of defense for personnel and readiness, discussing "Force of the Future" pay and benefit initiatives, militarytimes.com, Sept. 1.***

**Check, Please**

"[Russian President Vladimir Putin is] taking Russia in the wrong direction for his own people, but it seems that that's the direction he wants to take them, towards one of more confrontation, and we're simply going to have to check that, both on our own security interest and because we have important allies and friends in that part of the world, and we have important treaty commitments in the case of NATO."***—Secretary of Defense Ashton B. Carter, remarks to Marines at Camp Pendleton, Calif.***

**Because of Russia, NATO's core mission—collective defense—is a focal point once again.**

# All for One in NATO

By Marc V. Schanz, Senior Editor

*Royal Netherlands Army soldiers and a US Army Black Hawk helicopter participate in Noble Jump, a NATO Very High Readiness Joint Task Force exercise, in June.*

NATO is reassessing and transforming its military capabilities and organization to better carry out its central mission: collective defense.

The alliance is engaged in a robust update of its training and exercises and re-tooling what members contribute to collective operations. The overhaul is needed to respond to 21st century threats, such as the "hybrid warfare" launched by Russia in its early 2014 invasion of Ukraine.

Since Russia's seizure of Crimea, NATO has been busy with a series of initiatives meant to reassure its easternmost members. These include creating and reinforcing new rapid-reaction military capabilities, streamlining the alliance's ponderous political-military decision-making process, and forming new joint headquarters and logistics nodes to enable future operations on the eastern front. The Crimea crisis also invigorated efforts to field better alliance-owned capabilities—intelligence, surveillance, and reconnaissance tools in particular—to provide better "strategic warning" and ISR collection to monitor threats, especially preparations for war.

## RETHINKING NATO

NATO officials say collective defense—the driving provision of the 1949 treaty creating the organization—has really not been rethought since the alliance bloomed to 28 members in the post-Cold War era. Current reforms have implications far beyond today's disagreement with Moscow over a nation, Ukraine, that is not a NATO member.

"We are not in a Cold War situation, but we are not in a strategic partnership with Russia, either," Secretary General Jens Stoltenberg said in June, just prior to a meeting in Brussels of the alliance's Defense Ministers. Beyond reassuring allies worried about Russian intentions, NATO is struggling to deal with the violence and turmoil of the Middle East and North Africa that directly affects members such as France, Greece, Italy, Spain, and Turkey, all of them awash in refugees.

From the east to the south, NATO must adapt to a "fundamentally changed" security environment, Stoltenberg said.

In March remarks at a NATO conference in Washington, D.C., Stoltenberg pointed out that "for the first time in NATO's history" it must embrace and fortify its commitment to collective defense in light of Russia's aggression and simultaneously reform its ability to quickly assess and respond to global crises wherever they emerge.

"We have to do both at the same time," he said. By doing so, NATO nations and their militaries will better confront the challenges of hybrid war, which he called a "dark reflection" of the alliance's approach to collective security. The term refers to using military and nonmilitary force to destabilize countries, using proxy forces, propaganda, special operations, and intimidation to lay a "thick fog of confusion" over aggressive military actions. This approach is nothing less than "a test of our resolve to resist and

Photo by Evert-Jan Daniels

to defend ourselves," Stoltenberg said, and NATO must respond.

According to Royal Danish Army Gen. Knud Bartels, head of NATO's Military Committee from July 2012 to May 2015, what is now occurring in NATO is nothing short of a "reposturing of the alliance at the military level." Ongoing assurance activities, such as exercises launched in the wake of the Crimean annexation, are being linked to NATO's Connected Forces Initiative (CFI).

Started before Russia's Crimea invasion, the CFI seeks to better connect NATO militaries and speed up response time. The long-running effort to transform NATO operations in the years after the Cold War will be "accelerated," Bartels said last October.

For an organization placing high value on deliberation and consensus-building, the last year has seen a rapid pace of reform. Some of the revamped military capabilities and concepts—first articulated at the alliance's September 2014 Wales Summit—are now operational, most notably the Very High Readiness Joint Task Force (VJTF), also known as the Spearhead Force.

The 5,000-strong rapid response group comprises land, air, sea, and special operations forces, organized and equipped to respond to threats within 48 hours. In April, it reached interim capability—full operational capability is projected for 2016—and began a series of exercises focused on alert procedures and rapid deployment.

## NOBLE JUMP

In early June, NATO carried out Exercise Noble Jump 2015, a full deployment exercise of the interim VJTF in Zagan, Poland, involving some 2,100 troops from nine alliance countries simulating a deployment from Central Europe to Eastern Europe. The event marked the first time

NATO photos


***Above: A Norwegian air force F-16 during an air policing mission over the Baltics. Left: A NATO E-3 AWACS at Siauliai AB, Lithuania. The ISR aircraft have been heavily involved in monitoring the alliance's eastern periphery.***

the interim force deployed to conduct simulated tactical maneuvers as part of a reinvigorated NATO Response Force.

In February, NATO Defense Ministers approved the enhancement of the NATO Response Force in light of the new threats facing the alliance, declaring they would expand its size to 30,000 troops, representing two additional brigades' worth of rapid reinforcement capability coupled to the VJTF.

The Supreme Allied Commander Transformation (SACT), French air force Gen. Jean-Paul Palomeros, speaking with media at Noble Jump in June, said the event combined many of the concepts articulated in NATO's CFI, and reinforced the creation of the Spearhead Force.

"Today is the mark of determination of NATO, of the allies, to regain on readiness, to re-emphasize credibility," and show it has the capability to conduct high intensity operations rapidly, Palomeros said. Stoltenberg attended the event as well and touted its success days before the alliance's June defense ministerial in Brussels.

he said. "What's actually changing here?" he asked rhetorically. "Yes, we're exercising more in the east, but what are we doing internally to reset ourselves for these new challenges?"

The answer came in the form of several enhancements to NATO's reform plans, agreed to during the June defense ministerial in Brussels. These expanded the support mechanisms for the NATO Response Force and the Spearhead Force. Ministers approved an increase in the strength and capabilities of the NRF— particularly air, maritime, and special operations forces, Stoltenberg said in June. "All together, the enhanced

a meaningful way and taking the lead. That, of course, is very welcome," Lute observed.

In addition, the alliance in June approved the design of six small headquarters elements in Bulgaria, Estonia, Latvia, Lithuania, Poland, and Romania. Each will be staffed by about 40 people and play a key role in planning NATO military events in those countries, exercising and assisting in potential reinforcement in the event of crisis. A senior NATO policy official, speaking on background, said these "NATO Force Integration Units" will be operational by Jan. 1, 2016.

NATO photo by Mass Comm. Spec. 1st Class Josh Keim

***A German army corporal fires an anti-tank rocket at a live fire range during Noble Jump. The exercise marked the first deployment drill for the interim Spearhead Force of 2,100 troops from nine NATO nations.***

"The establishment of this new Spearhead Force and the exercise in Poland sends a very clear signal that NATO is here. And NATO is ready," he said.

The refinement of the NRF and the creation of the VJTF are only the first steps in NATO's reboot of collective defense activities. US Ambassador to NATO Douglas E. Lute told reporters in June that since May 2014, the US and many NATO allies have ramped up exercising across NATO's easternmost member states: those in the Baltics, plus Poland, Bulgaria, and Romania. The next step of the alliance's readiness enhancement plans, he said, has to do with "how NATO is actually adapting,"

NATO Response Force will consist of up to 40,000 personnel," he said, more than triple its previous level of some 13,000 troops.

The range of forces available to the NRF and VJTF allows alliance leaders to change their compositions depending on the scenario and which allies contribute forces, a senior NATO policy official said. While Spain will lead the first fully operational Spearhead Force next year, seven other NATO allies have signed up to lead it in the future, Lute said. These additions and commitments show the VJTF has depth, he said, and the force is not just a concept on paper. "The European allies are stepping up in

"It's slightly different for each country, but it is mostly a national process," the official said in a June briefing at NATO headquarters. These integration units, experts on the character and capabilities of the local forces and facilities, are to "ease and speed up the incoming VJTF," he said.

At the June meeting, alliance Defense Ministers approved formation of a Joint Standing Logistics Group (JSLG), inside

Photo via USAF

*An F-15C intercepts a Russian Su-24 attack aircraft during a NATO air policing mission.*

of NATO's command structure. It will enable reception, staging, and onward movement of NATO Response Force or spearhead units called to action. This group will provide all manner of supply to rapidly deploying NATO forces—from fuel and munitions to stocks—the official explained. Since the NRF is slated to be populated with forces from multiple nations, the alliance has decided it must "centralize" logistical support. "A fighting force does not function without this," he said.

## GETTING REAL

While building logistical support for its energized rapid response forces, NATO has revamped its political and military decision-making to enable swift response to hybrid events or other rapidly evolving contingencies. In a crisis, the Supreme Allied Commander, Europe, now has the ability to "alert, stage, and prepare" forces. This is a significant change: Previously, the North Atlantic Council had to approve any alliance preparations for potential operations. For the VJTF to act swiftly, it must be allowed to prepare while NATO's political process plays out, the official noted. However, the North Atlantic Council must still approve any real-world mobilization of forces.

Exercises will be made more realistic to retain the credibility and effectiveness of these forces. According to two senior NATO military officials briefing at the June defense ministerial, NATO's two strategic commands—Allied Command Operations (ACO) and Allied Command Transformation (ACT)—have completed updating and refining an exercise program that runs through 2020. This year alone, some 300 events will take place across the alliance—about a third organized and led by NATO and the rest conducted by NATO countries offering compatible training events. The expansion, one official said, is possible in part due to NATO's drawdown from its Afghanistan International Security Assistance Force combat mission. This has freed up forces to develop high-intensity interoperability exercises.

The first major milestone in this plan begins this month. Exercise Trident Juncture 2015, running through Nov. 6 across locations in Italy, Portugal, and Spain, marks a major test for the Spearhead Force. The exercise is NATO's largest since the end of the Cold War, with more than 30,000 personnel taking part in validating the concepts first explored in the Noble Jump event in June.

Noble Jump was "a brigade-sized unit," one NATO military official said. "Here we have four [brigades' worth] being tested and exercised." The live portion of the event, slated to start later this month, will feature events and scenarios testing ISR collection and analysis; surveillance and target acquisition; and strategic communications and Air Force sustainment for the VJTF.

German Maj. Gen. Erich G. Siegmann, chief of staff of Allied Air Command, said in a June interview that Trident Juncture will be a venue to validate alliance air operations in

*NATO Secretary General Jens Stoltenberg speaks to the press after a Noble Jump training scenario.*

NATO photo

the context of the VJTF. In any rapid response scenario, NATO's ability to quickly secure air superiority is paramount, he said. Any NATO force could be challenged immediately if these skills are not fine-tuned, and Trident Juncture will feature training in some of these tasks, such as conducting air defense and ISR in contested areas. An estimated 200 aircraft from NATO nations will participate in the event, he said.

The exercise will include the new NATO joint force air component node at Poggio Renatico, Italy, part of the Air Command and Control System. Declared operational July 3, the Italy node will participate in Trident Juncture to validate its ability to command complex air operations across the alliance. Eventually, the ACCS network will comprise more than 20 control centers covering more than 3.8 million square miles of airspace and will become a key building block in NATO's plan to build a robust air and missile defense system.

Though many activities related to the VJTF's validation are ground-centric, Siegmann said NATO will soon expand training and exercising for alliance air capabilities as well. Trident Javelin, scheduled for 2017, is one such large joint force exercise and will focus on alliance air operations.

NATO airpower is a key enabler for better strategic warning, crucial to inform the alliance's political process as it chooses how to act against new threats.

To support this goal, NATO is pursuing the Alliance Ground Surveillance program, eventually to involve five Global Hawk remotely piloted aircraft. Members of the AGS test team began arriving at Naval Air Station Sigonella on Italy's island of Sicily in July. Pilots are being trained in the US and maintainers are working with contractors for more "hands-on training" in operations, said German air force Col. Uwe Klein, AGS implementation team leader at Supreme Headquarters Allied Powers Europe in Belgium.

Initial operational capability for the AGS system is anticipated by the end of 2018, he said. The aircraft—eventually to have some form of support from all 28 nations of the alliance—address a critical shortfall in NATO's ISR capabilities. The wide area ground surveillance aircraft not only provide strategic ISR, but also can send information directly to tactical commanders on the ground, Klein said.

Having this capability within NATO, rather than having to ask member nations like the US or UK to provide it for the whole alliance, will make a great difference in future operations, particularly Spearhead Force mobilizations, Klein said.


NATO photo by HFw Christian Timmig

*A Polish air force MiG-29, RAF Typhoon, and USAF F-15 fly in formation during a NATO air policing mission.*

"Before you deploy, ... you want to gather as much information as you can," he said. NATO ISR operations will be more able to conduct "fact-finding missions" to verify evidence of rapidly changing events, such as the movement of troops or civil unrest. "If you can verify and monitor events, ... you will create the evidence and contain the outbreak of crisis," he asserted. The powerful ground sensors of AGS will complement NATO's other organic ISR asset, its E-3 AWACS fleet, heavily involved in monitoring NATO's eastern periphery since February 2014.

## INTEGRATION

Using both active and passive sensors, the AWACS fleet is proving a "highly responsive" element of NATO's reassurance activities and will also serve a vital battle management role in supporting VJTF operations, according to USAF Brig. Gen. Dawn M. Dunlop, NATO's AWACS fleet commander. Integrating the two capabilities will take time, she noted, but as communications links with air operations centers mature, the pairing of the air and ground picture will give NATO commanders a perspective they didn't always have before. "It's [about] understanding how these integrate together and how they provide information for commanders" for future operations, she added.

NATO is pushing to expand training among its member nations in imagery analysis, to build a more robust cadre of targeting experts. Targeting analysis was identified as a key shortcoming by NATO "lessons learned" analysts after 2011's Libya air campaign. "We want to enhance the alliance's ability to conduct joint ISR operations and share data," a NATO official said. "This is done by enhancing training, improving our procedures and doctrine, and upgrading network capability" to optimize the use of valuable but limited assets such as AWACS and AGS in future operations.

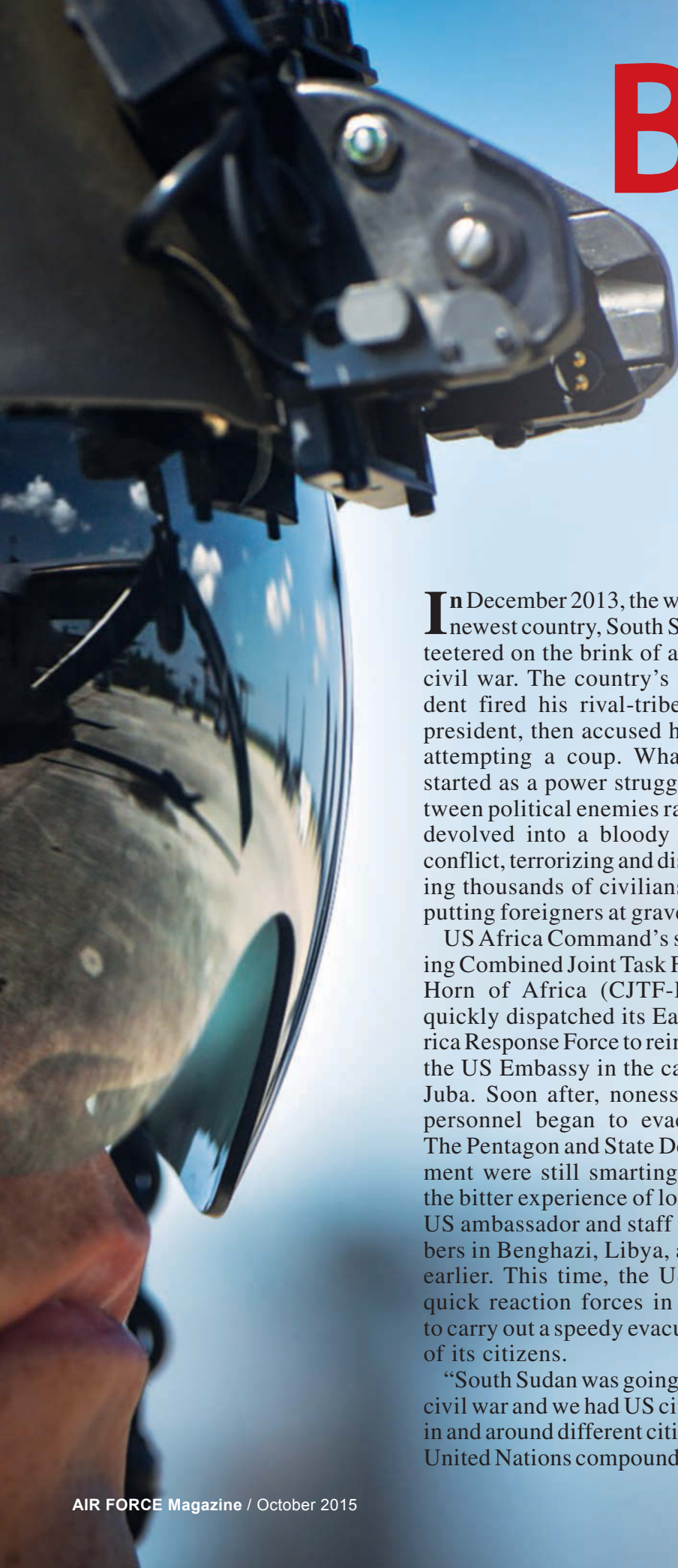
Stoltenberg declared "significant progress" is being made toward meeting goals with NATO rapid reaction forces in time for the alliance's Warsaw Summit next year. Obstacles remain, however, beyond the situation in Ukraine that could affect the broad transformation push, most notably in funding. The US has earmarked high-end enablers for the NRF and VJTF—such as ISR assets, airlift, special operations forces, and other contributions—but the US is one of only five NATO allies that have met the alliance goal of contributing two percent of gross domestic product to defense. Those figures were confirmed by NATO officials just prior to the start of the June defense ministerial.

"That's good news; however, the picture is mixed," one official stated, given that at least 10 NATO members have not even moved toward meeting the self-imposed goal. Despite continued economic stresses across Europe putting pressure on defense spending of many NATO members, "we need to redouble our efforts to reverse this trend," he said. ✪

# A CV-22 mission to evacuate Americans from violence in South Sudan nearly killed the rescuers.

***MSgt. David Shea—then a technical sergeant—couldn't return fire because the rebels were hiding among the refugees thronging the UN compound in Bor.***

Photo courtesy of Sean Mendis



# Blood Over Bor

By Aaron M. U. Church, Associate Editor

In December 2013, the world's newest country, South Sudan, teetered on the brink of a fresh civil war. The country's president fired his rival-tribe vice president, then accused him of attempting a coup. What had started as a power struggle between political enemies rapidly devolved into a bloody tribal conflict, terrorizing and displacing thousands of civilians, and putting foreigners at grave risk.

US Africa Command's standing Combined Joint Task Force-Horn of Africa (CJTF-HOA) quickly dispatched its East Africa Response Force to reinforce the US Embassy in the capital, Juba. Soon after, nonessential personnel began to evacuate. The Pentagon and State Department were still smarting from the bitter experience of losing a US ambassador and staff members in Benghazi, Libya, a year earlier. This time, the US had quick reaction forces in place to carry out a speedy evacuation of its citizens.

"South Sudan was going into a civil war and we had US citizens in and around different cities," at United Nations compounds, and in the embassy that needed to be evacuated, explained then-TSgt. David A. Shea, a CV-22 flight engineer with the 8th Special Operations Squadron, deployed from Hurlburt Field, Fla.

The CV-22s had been detached to Camp Lemonnier, Djibouti, supporting CJTF-HOA when the call came on Dec. 18—three days after the unrest began—to start pulling embassy staff from South Sudan. Two C-130s and several tilt-rotor CV-22s—able to rotate their engines to fly like an airplane but take off and land like a helicopter—departed Camp Lemonnier en route to Juba to grab the first wave of evacuees.

After a 1,000-mile flight into South Sudan, the airlift armada found Juba Airport's single runway blocked.

"We flew all the way out there, but the C-130s weren't able to get in," Shea said. The runway was eventually cleared and the C-130s evacuated about 120 people to Nairobi, Kenya. The CV-22s turned back to Camp Lemonnier and "we thought that was the end of it," said Shea, but "it turns out there are a lot of Americans up


USAF photo

*Shea kept pressure on a the special operations team leader's arterial wound during the long, dangerous flight to Entebbe Airport, Uganda, likely saving his life.*

in Bor" at a UN compound as part of a peacekeeping mission there. In addition to the US and international staff, some 14,000 refugees fleeing the rebel onslaught had taken refuge at the base. Bor, the capital of South Sudan's largest state, Jonglei, was one of the first major areas to fall to the rebels, and the UN compound was now encircled by thousands of them.

Unlike Juba, which was held in government hands, it was tough to figure out who exactly controlled Bor. US officials contacted rebel leaders in the area and informed them US military forces would be arriving to extract Americans from the UN base. Shea and the rest of the extraction party were told that the rebels expected them and the landing zone would be a "permissive environment" with little to "no chance of catching any kind of fire at all."

## ERUPTION

On Dec. 21, 2013, Shea's CV-22—call sign Rooster 73—lifted off from Camp Lemonnier. It led two other Ospreys—Rooster 74

***The CV-22s were riddled with anti-aircraft and small-arms fire. All three were badly damaged, and none so much as Rooster 73, which lost electrical and hydraulics systems. A round pierced a particularly important fuel line that could not be isolated.***

and Rooster 75—and took turns refueling from the MC-130P Combat Shadow en route to Bor, located another 1,000-mile flight from Djibouti. The passengers were a special operations security team to secure the landing zone, pararescue and medical personnel to treat potential injuries, and agency liaisons to coordinate the effort.

The three-ship formation dropped to low altitude as it approached the UN peacekeeping base, several miles east of Bor, and executed a low pass to assess conditions on the ground. Since the rebel forces had been notified in advance, seeing three Ospreys roaring overhead "shouldn't have been a surprise to them," said Shea. This time, the dirt airstrip adjacent to the UN compound appeared clear of obstructions, so Shea's lead Osprey circled back to the runway for touchdown.

Turning to land, "it just erupted," Shea said, describing how the rebel force fired on them. "They lit us up pretty good."

Just as Rooster 73 rotated its engine nacelles vertical for landing, anti-aircraft and small-arms fire tore through the fuselage.

"Right away, we had multiple systems failing," Shea said. He saw that "they had hit electrical systems, hydraulic systems," and fuel was spewing from the "only spot in our fuel lines that you can't isolate."


*A flight engineer sits on the ramp of a CV-22 Osprey at Entebbe during the deployment for US Africa Command.*

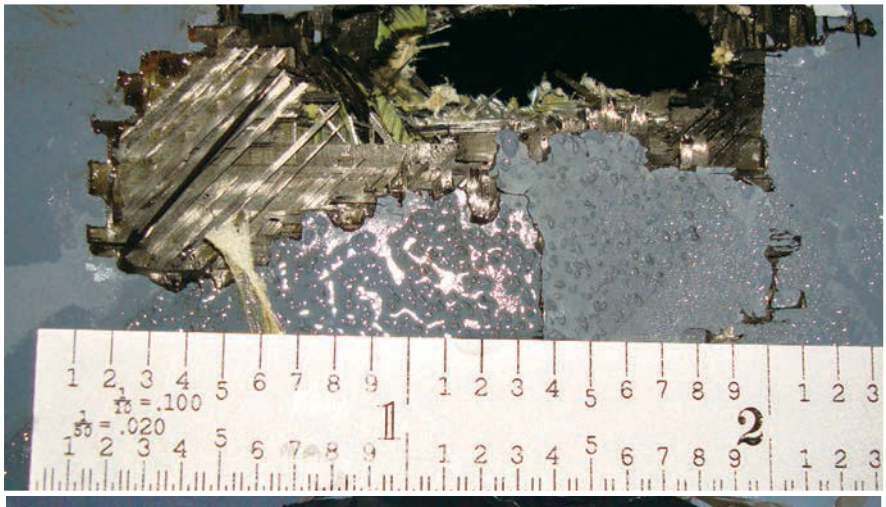
While assessing the damage, trying to identify targets, and manning the machine gun on the aft ramp, Shea took a hit directly to the chest. The force of the impact threw him several feet backward into the cargo bay, leaving him stunned on the floor. "Once I realized what just happened, I turned around and everybody was laying on the ground. … In my head, they were all dead. … Nobody was moving."

Shea hurriedly checked his body for wounds. He found none, although he was drenched in blood from the others. The round had smashed into his armored chest plate, leaving him stunned but relatively unhurt.

"I didn't really know if I was 'good'—I just didn't feel any pain," Shea said. Presuming his comrades dead, he clambered back to the gun in time to see the second and third Ospreys breaking away to dodge the firestorm. They were "just getting lit up from everywhere."

Shea could see muzzle flashes from the crowd below, but the throngs of civilian refugees cramming the makeshift camp made it impossible for the airmen to shoot back.

"These guys had embedded themselves inside of the crowd around the compound and they were everywhere—I mean just all over the place. It was a full-up ambush."




## FLYING STRAIGHT

Extracting the people on the ground under intense fire was obviously out of the question, and the Ospreys were too badly damaged to make a second attempt.

As Shea's CV-22 left the area, vapors from the fuel leak made it so that "we couldn't even breathe in the cabin." He instinctively raised the rear ramp, not realizing this action would "spit out all of our hydraulic fluid" for most of the aircraft's tertiary systems. As the ramp closed, shutting out most of the vapors, his head began to clear.

All three Ospreys were badly damaged and "the chatter's just crazy" over the radios and the intercom, Shea recalled.

Pilots Maj. Ryan P. Mittelstet and Capt. Brett J. Cassidy coordinated with Shea's fellow flight engineer, SSgt. Christopher Nin, trying to get the aircraft "flying straight." Most of the rest of the passengers lay in blood on the floor.


USAF photo

***The three Osprey crews received the 2013 Mackay Trophy for the Air Force's most meritorious flight of the year.***

"They had all taken rounds through the lower extremities," and the injuries were bad—but not immediately fatal, as Shea had initially thought.

"Everybody's freaking out because those are their buddies, you know? Those are my buddies," he said.

Shea started to help patch up his wounded crewmates. The special operations team leader directly behind Shea had the most critical wounds, suffering an arterial bleed. The medics applied a tourniquet and Shea packed the wound with combat-gauze, but the bleeding wouldn't stop. "I had to keep pressure on it the entire flight" to the divert airfield, he said.

The formation opted to divert to Entebbe, Uganda, rather than risk a long return flight through the mountainous terrain and in the poor weather they'd flown through on the way to South Sudan. Still, Entebbe was some 400 miles away and the tilt-rotors would never make it on their own, given their battle damage.

Rooster 73 was gushing fuel "like crazy" and needed to refuel from a tanker—and quickly—to stay airborne. Fortunately, the MC-130 tankers were still orbiting "right where we needed them to be," said Shea.

As Rooster 73 prepared to rendezvous with the Combat Shadow, the crew realized their Osprey's auxiliary hydraulic system was completely out. Nin had to laboriously hand-crank the refueling probe to full extension—the first time to their knowledge that had ever been done on an operational mission.

Rooster 75—the third Osprey approaching the landing in Bor—was the least damaged and hung back to allow the torn-up lead and second aircraft to take fuel first.

With the refueling underway, one of the medics organized a "mobile blood bank" between the three aircraft so the seriously wounded could get transfusions as soon as they landed in Uganda. Shea was still keeping pressure on his crewmate's wound. "In the other hand I was holding an IV and trying to talk, give blood types," and help Nin with the aircraft.

Rooster 73 was spewing fuel so quickly it soon required a second tanker hookup. During the 90-minute flight from Bor to Entebbe, the long-ranged Osprey wouldn't normally need refueling, so after the first run at the tanker, Nin had diligently cranked the probe back into the stowed position. Now, "he had to crank that thing out twice, … which is some 300 cranks," Shea said. The Osprey had taken on some 12,000 pounds of fuel on the first go—about equal to the CV-22's entire fuel capacity—and now needed more because it was gushing out so rapidly.

## LANDING AT ENTEBBE

To try to use the fuel before it sprayed away between refuelings, pilots Mittelstet and Cassidy throttled the Osprey full-out to cover the distance.

"Those guys were calm the whole time; they got the plugs that we needed and they got us home as fast as they could," Shea said.

As the Ospreys made it over the border into Uganda, the extent of the damage became more clear. They had lost a generator and the hydraulic system for the landing gear, fuel probe, ramp and door, nosewheel steering, and other systems. Without the hydraulic system, the pilots were forced to "blow down" the landing gear with an emergency pressurized nitrogen system on approach to Entebbe Airport.

Without wheel brakes or nosewheel steering, Rooster 73 had to hover-taxi its way to a parking spot. Even the parking brake was out of commission, and with no chocks on hand, Shea used ammo cans to block the tires and keep the Osprey from rolling across the ramp. "At the same time, I have to run back and start transloading the casualties" onto a waiting airlifter.

"Luckily, there was a C-17 that was on its way home—they kicked off all the Army guys" and began prepping the aircraft for an aeromedical evacuation to a trauma hospital in Nairobi.

Almost miraculously, most of the soldiers aboard the C-17 were part of a field medical team. The medics and surgeons "just jumped right into it, helping us out," Shea said. The blood donated by everyone aboard the CV-22s in the air was immediately transfused to the worst wounded.

"If they hadn't had that blood ready, some of them would not have survived," Shea said, but in the end, "we didn't lose anybody."

Although Rooster 73 took the brunt of the damage, Shea estimated the three aircraft were hit by nearly 200 rounds. The extent of the damage was "unprecedented" for the CV-22 fleet and Bell-Boeing engineers and technicians spent several months at Entebbe Airport putting the aircraft back together. "They figured it out, they flew them out of there. … They're flying now back at Hurlburt with Band-Aids all over them," Shea reported.

The Americans at the embattled UN compound in Bor were successfully evacuated to the capital, Juba, the following day, joining some 300 US personnel on military and contract flights out of the country.

The three 8th SOS Osprey crews received the 2013 Mackay Trophy for the Air Force's "most meritorious flight of the year," from the National Aeronautic Association. "The time critical decision-making, outstanding airmanship, extraordinary crew resource management … saved 34 aircrew and three $89 million aircraft," the award citation stated. ✪

# OPERATION INHERENT RESOLVE

Text by Aaron M. U. Church

## Hitting ISIS where it hurts.


*US aircraft acting as top cover for the Iraqi security forces and militias began air strikes to roll back the rampage of the self-styled Islamic State beginning on Aug. 8, 2014. The next month, the air campaign broadened, with the aid of several Persian Gulf allies, to hit ISIS targets across the border in war-torn Syria. On the night of Sept. 22, 2014, F-22 Raptors made their combat debut leading a strike group of F-15Es, F-16s, and B-1s, after an opening barrage of sea-launched cruise missiles. The coalition quickly gained strength as allies from Australia, Britain, Canada, and Europe joined the campaign—retroactively dubbed Operation Inherent Resolve. In the one year since OIR began, the coalition has damaged or destroyed some 10,700 targets, in what has been an air operation with the most precisely hit targets. This July, Turkey made a hugely important contribution, allowing US combat aircraft to fly from Incirlik Air Base to hit targets just over the border in Syria. Here, an F-15E Strike Eagle deployed from RAF Lakenheath, UK, refuels from an Air Force Reserve Command KC-135 over northern Iraq during the second night of F-22 strikes, Sept. 23, 2014.*

USAF photo by SrA. Matthew Bruch

USAF photo by SSgt. Shawn Nickel

USAF photo

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USAF photo by TSgt. Russ Scalf

5

***|1|*** *US Central Command activated a second KC-135 squadron at al Udeid AB, Qatar, this July to take some of the burden off 340th Expeditionary Air Refueling Squadron—the largest in the region and supporting OIR since Day One.* ***|2|*** *A Navy F/A-18F Super Hornet takes on fuel from a Royal Australian Air Force KC-30 tanker. Australia deployed fighters, AWACS, and tankers, responding to US requests for assistance in September 2014.* ***|3|*** *Aircrews prepare two KC-10 tankers for missions into Syria, Sept. 23, 2014.* ***|4|*** *An E-3B AWACS flight engineer calculates aircraft weight and balance before a sortie over northeastern Iraq last October. AWACS proved crucial not only to direct coalition aircraft, but to avoid run-ins with Syrian or Iranian military aircraft fighting anti-government rebels in Syria's ongoing civil war.* ***|5|*** *F-15Es took part in bombing 12 ISIS-held Syrian refineries during the opening week*

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USAF photo by TSgt. Christopher Boitz

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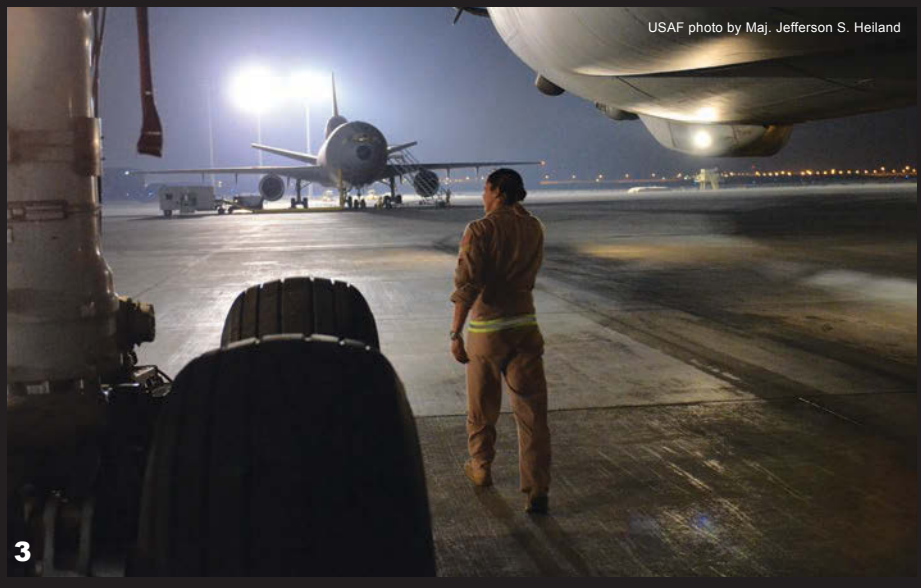

USAF photo by Maj. Jefferson S. Heiland

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USAF photo

*of a fall 2014 effort, denting the ISIS ability to finance and fuel its land-grab.* |**6**| *Aircrew aboard an AWACS direct coalition aircraft hitting targets in northeastern Iraq on Oct. 2, 2014. Canada announced it would contribute fighters, ISR, and tanker aircraft to the coalition the same week.*

USAF photo by Maj. Jefferson S. Heiland

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USAF photo by SrA. Matthew Bruch

USAF photo by SrA. Matthew Bruch

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USAF photo by SrA. Matthew Bruch

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USAF photo by TSgt. Russ Scalf

USAF photo by SSgt. Shawn Nickel

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***|1|*** *F-22s have sidestepped possible Syrian air defenses and have acted as key enablers, passing situational awareness and targeting information to other strike aircraft, since the opening days of OIR.* ***|2|*** *Maj. Gena Fedoruk completes a preflight check on a KC-135. As of Aug. 1, 2015, coalition refuelers had offloaded some 557 million pounds of fuel over more than 8,900 sorties for OIR.* ***|3|*** *KC-135 pilots Fedoruk and 1st Lt. Marcel Trott speed down the runway on a sortie to refuel coalition aircraft. Saudi Arabia and the United Arab Emirates joined US aircraft for a coalition that would eventually grow to include some 60 countries.* ***|4|*** *A 1st Fighter Wing F-22 prepares to taxi for the type's first test in combat.* ***|5|*** *F/A-18E/F Super Hornets from the carrier USS* George H. W. Bush *took part in the opening days of the 2014 strikes, while USS* Arleigh Burke *and USS* Philippine Sea *launched Tomahawk missiles against targets, notably, near Aleppo, Syria.* ***|6|*** *Lakenheath F-15Es light up the sky over northern Iraq after hitting ISIS barracks, training camps, and vehicles.*

*|**1**| A night vision goggle-equipped Strike Eagle crew sits in a blacked-out cockpit awaiting launch. |**2**| A 1st Fighter Wing Raptor takes on fuel from a KC-10 during a Syria strike. In summer 2014, the F-22s had been preparing to head back to JB Langley-Eustis, Va., from a Middle East deployment when they were retasked to support OIR. |**3**| Boom operator MSgt. Jeffrey Morris checks aircraft forms on a KC-135 flight deck before departure. |**4**| An A-10 pilot prepares to disembark from his aircraft after a mission for Inherent Resolve in January. |**5**| Airmen load cargo onto a C-5 Galaxy at Aviano AB, Italy, for the deployment of six F-16s to Incirlik this past August. |**6**| A 35th Fighter Wing F-16C gets airborne at Incirlik, several days after deploying to Turkey, Aug. 12, 2015. Turkish jets joined the coalition that month, following diplomatic pressure from the US. |**7**| A B-1B from the 34th Expeditionary Bomb Squadron in the skies over Iraq this past February.*

1

USAF photo by SrA. Krystal Ardrey

6

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USAF photo by A1C Deana Heitzman

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USAF photo by SrA. James Richardson

USAF photo by TSgt. Russ Scalf

USAF photo by SSgt. Perry Aston

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USAF photo by Maj. Jefferson S. Heiland


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USAF photo by SSgt. Shawn Nickel


USAF photo by SSgt. Shawn Nickel

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USAF photo

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USAF photo by SrA. James Richardson

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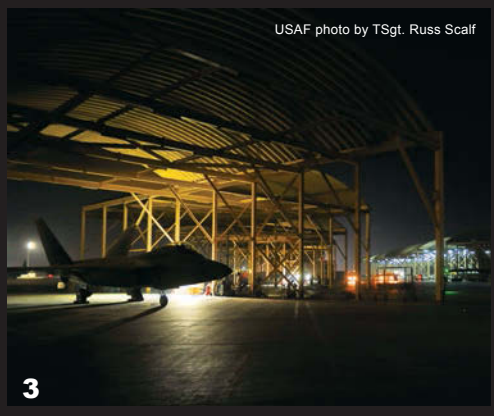
USAF photo by TSgt. Russ Scalf

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USAF photo by SrA. James Richardson

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***|1|*** *Pilot Maj. Erik Schillo checks a KC-135 refueling boom. The hose and drogue basket attached to the boom enables the tanker to refuel probe-equipped Navy and allied combat aircraft.* ***|2|*** *Maintainers prepare an E-3B Sentry for a sortie in October 2014. Australia, France, and Britain have deployed AWACS for operations over Iraq. The Royal Air Force has contributed formidable ISR capability, including RC-135s, Sentinel ground surveillance aircraft, and remotely piloted aircraft.* ***|3|*** *An F-22 with weapons hidden within its internal bays waits for launch on its first combat mission.* ***|4|*** *Indiana Air National Guard A-10 crew chiefs await their returning jets at a base in the Persian Gulf, Jan. 31. The 122nd flew OIR's first A-10 rotation starting last November 2014, relieved by Michigan ANG A-10s in April 2015.* ***|5|*** *A 122nd A-10 takes off with a full load of precision weapons, including Maverick missiles, laser and GPS guided bombs, rockets, and a Litening targeting pod. Coalition air strikes have greatly degraded ISIS' ability to mass forces and take ground.* ✪

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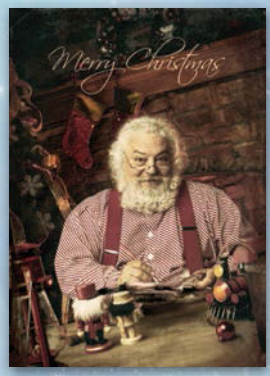


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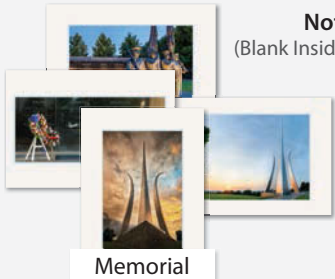
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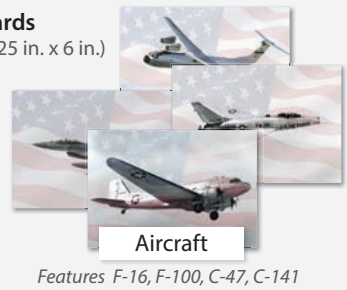
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1

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3

*[1] First Lieutenant Gable with .50 cal slings, headed to firing practice in January 1943. [2] Now-Captain Gable at waist-gun position in England in June 1943. [3] Poster for "Combat America." [4] As Rhett Butler, with Vivien Leigh as Scarlett O'Hara, in "Gone with the Wind."*

*In 1941, Clark Gable was the undisputed King of Hollywood. He had won the Oscar for Best Actor in 1935, gained world fame for his role as Rhett Butler in "Gone with the Wind" in 1939, and was making a whopping $30,000 per month. Then came World War II and Gable—like Jimmy Stewart, Henry Fonda, and other stars—responded. At 41, he enlisted in the Army Air Forces as a private. He earned a commission in 1942 and was assigned to Eighth Air Force in 1943. Trained as a waist gunner, Gable flew operational missions with 351st Bomb Group over Europe, firing at enemy fighters even as he obtained footage for "Combat America," an AAF film used in bond drives. Gable flew his last mission on Sept. 23, 1943. He returned to the US to edit the film and, though he hoped for new combat orders, they never came. Gable was discharged in 1944. When Maj. Clark Gable died in 1960, the former B-17 gunner received Air Force funeral honors.*

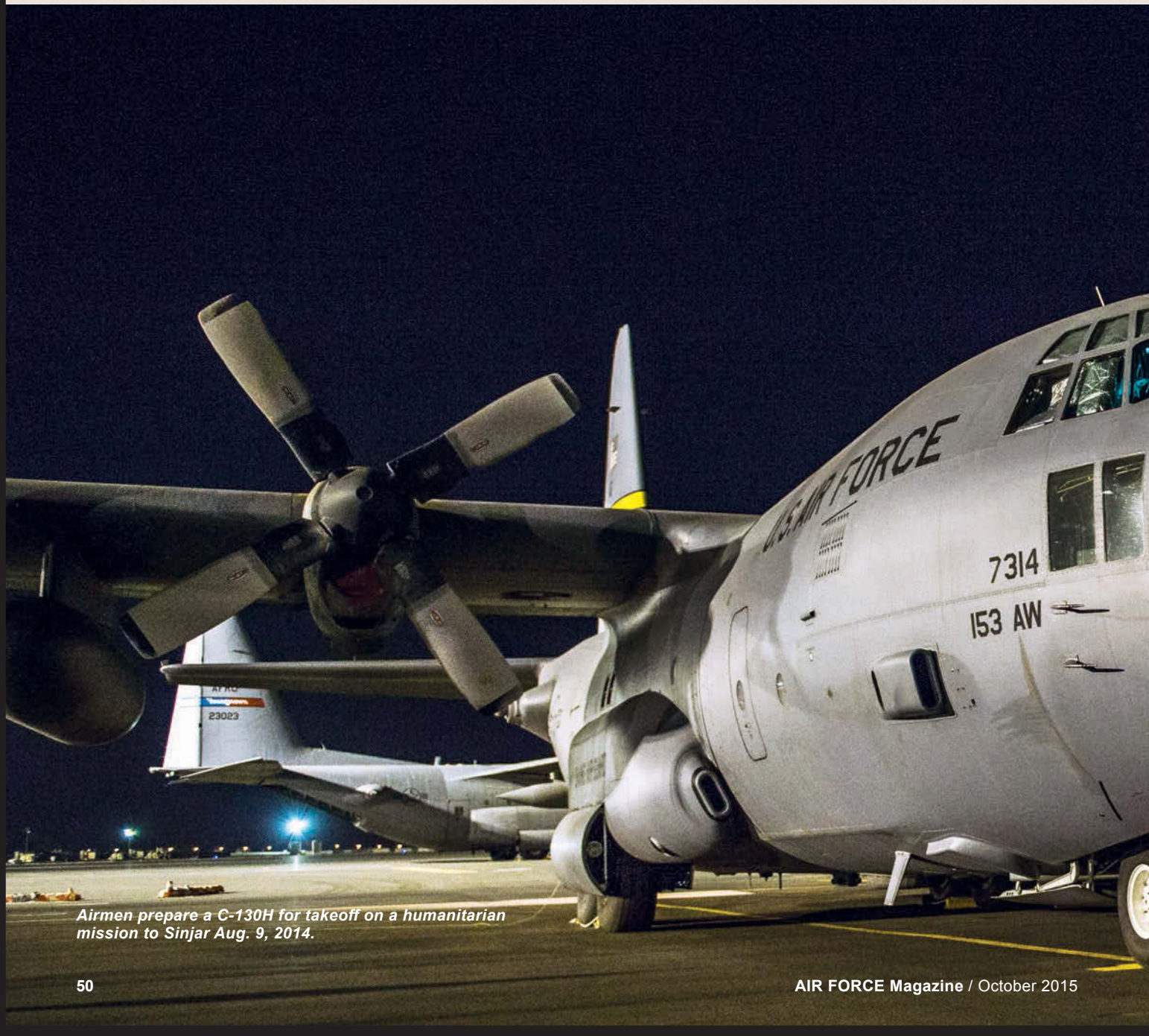
Photo from MGM

4

# Breaking the Siege on Sinjar

**USAF stepped in with an urgent relief effort when ISIS threatened a humanitarian catastrophe.**

By Jennifer Hlad, Senior Editor




*Airmen prepare a C-130H for takeoff on a humanitarian mission to Sinjar Aug. 9, 2014.*

In early August 2014, after months of waging war across Iraq, the terrorists of the Islamic State (ISIS) had taken Mosul and Tikrit and had fixed their sights on the Yazidis, a Kurdish-speaking religious minority group living in northern Iraq.

Facing death, torture, or enslavement at the hands of ISIS terrorists, tens of thousands of Yazidis fled their homes but became trapped on Mount Sinjar with no food, water, or shelter.

Up to that point, the US had avoided military action against ISIS, but the worsening humanitarian crisis drove President Barack Obama to action: On Aug. 7, he authorized the first air strikes against ISIS, in what is now known as Operation Inherent Resolve, and an Air Force-led relief mission aimed at preventing what he called "a potential act of genocide."

"When many thousands of innocent civilians are faced with the danger of being wiped out, and we have the capacity to do something about it, we will take action," he said. "That is our responsibility as Americans. That's a hallmark of American leadership. That's who we are."

## PLANNING THE DROP

US troops in the region had seen intelligence about the situation on Mount Sinjar, but first received notification about potential relief airdrops on Aug. 5—about 36 hours before the first flights took off.

The request came from the government of Iraq, going through US Air Forces Central Command before landing at the Theater Direct Delivery Cell of the Air Mobility Division at the 609th Air Operations Center at al Udeid AB, Qatar. The 609th is one of USAF's combined air and space operations centers, or CAOCs.

Maj. Mike Damron, who was then the AMD tactics chief with the CAOC there, said while the US and the Air Force still needed to secure the proper legal approvals and diplomatic clearances, "we knew there was a very good possibility of doing the drop."

That meant not just looking at how much water and food AFCENT had on hand, but also how many aircraft were needed,

USAF photo by SSgt. Jeremy Bowcock

where the pallets should be dropped, which crews to put on crew rest, what maintenance needed to be done, and how they would handle unforeseen variables like aircraft breakdowns.

Airmen from the 437th Airlift Wing, JB Charleston, S.C., who at the time were deployed to the Central Command area as part of the 816th Expeditionary Airlift Squadron, stood up a mission planning cell at the CAOC to begin working on a concept of operations, detailing how the airdrops would work on the tactical level.

The CAOC also alerted the 618th Air Operations Center, the Tanker Airlift Control Center at Scott Air Force Base in Illinois. At the Theater Direct Delivery Division there, Maj. Jason Homrig, deputy director of TDDD operations, began making plans for the C-17 portion of the mission.

"We started looking at manning forces and that kind of stuff," he said. "We were notified essentially as they were still framing the formation, how the actual air drops were going to go, to get the required aid in place."

Homrig, a C-130 pilot, had flown humanitarian assistance and disaster relief missions before—including Operation Damayan after the 2013 super typhoon in the Philippines—which he said helps bring perspective to the planning process. But this mission was different. Instead of landing somewhere to unload relief supplies after a natural disaster or dropping supplies to US troops, the Air Force would be dropping supplies to non-Americans under the cover of darkness, on a mountain surrounded by hostile forces.

The US airmen didn't know exactly what the situation was on the ground, Homrig said, but were told there were potentially "tens of thousands of people" cut off from any normal supply route.

In an address to the nation from the White House, Obama said the Yazidis were facing "almost certain death."

"When we face a situation like we do on that mountain—with innocent people facing the prospect of violence on a horrific scale, when we have a mandate to help, … and when we have the unique capabilities to help avert a massacre, then I believe the United States of America cannot turn a blind eye," Obama said. "Earlier this week, one Iraqi in the area cried to the world, 'There is no one coming to help.' Well, today, America is coming to help."

ISIS had created the need for the airdrops, and also made the relief efforts more difficult. The aircraft would need to fly at low altitude, in the darkness, and remain over the drop zones for less than 15 minutes.

Damron had participated in airdrops in Afghanistan before—from inside the aircraft. But US troops always cleared the drops, he said. The Mount Sinjar mission called for dropping pallets of supplies to civilians on the ground.

"Our worst fear" was to drop stuff out of an aircraft that would land on the people it was supposed to aid, he said.

Another challenge: The mission brought together troops from several different US commands, plus C-130s and their crews from the United Kingdom and Australia.

Still, Homrig said, pilots and crews train for airdrops in complex scenarios. "We are experienced at this, and so when it comes down to actual mission execution, you really rely on that training and that experience, and it will take you through," he said.

With the advantage of prior planning, Damron said they had around a

USAF photos by SSgt. Vernon Young Jr.

***TSgt. Lynn Morelly, a C-17 loadmaster, watches bundles of supplies parachute to the ground at Sinjar. Right: Capt. Erica Stooksbury (r), a C-17 pilot, briefs her crew before taking off on an airdrop mission over the inaccessible Sinjar area of Iraq.***

***Above: MSgt. Pennie Brawley, a C-130 loadmaster, inventories halal MREs during an airdrop. Here (l-r): SrA. Quinton Hayward, SSgt. Joshua Brown, and MSgt. Steve Brown, C-17 loadmasters, adjust a bundle of halal MREs before delivery of the food and bottled water to displaced Yazidis at Mount Sinjar.***

70 percent solution when the Air Force was given the definite go-ahead, less than 24 hours before the airdrops were to begin. Even then, they weren't sure how long the airdrops would continue.

## A PERSONAL TOUCH

The first night of the mission, one C-17 and two C-130 Hercules aircraft flew to Sinjar, escorted by two F/A-18s from the carrier *George H. W. Bush,* in the Persian Gulf at the time. The airlifters dropped bundles containing 28,224 Meals, Ready to Eat, and 1,522 gallons of fresh drinking water.

But there was still work to do. Damron said he and others in the CAOC "planned straight through," looking at intelligence reports to determine where more supplies were needed, while others worked to secure approvals for subsequent drops.

"We knew we were going to be dropping again until we got orders to stop," he said. "We just didn't know exactly where on the mountain we were going to drop. That changed almost every night."

At the same time, the riggers—mainly soldiers—loading the pallets with food and water were working around the clock, Damron said. Some added a personal touch.

In a throwback to 1st Lt. Gail S. Halvorsen's "Candy Bomber" missions during the Berlin Airlift, MSgt. Stephen Brown, a loadmaster with the 816th Airlift Squadron, taped a package of Skittles to a bundle of halal MREs. This prompted others in Brown's unit to attach candy, toys, and even bags full of treats to later bundles.

"Although my favorite candy that doesn't melt in the desert heat is Starburst, I took what I had in my bag and just taped it to the side of the box," he said at the time. "I can imagine being in the shoes of these parents down there. Not being able to provide much during a time of war would be heartbreaking. This could be something that will make a dire situation a little brighter, even if it's just for a few moments."

In Illinois, Homrig and others with the AOC monitored the C-17 portion of the mission and provided command and control—while still monitoring more than 40 other sorties each day.

Damron took a broader view, making sure every person and aircraft worked together.

"From where I sit, I had access to every asset that was involved in the operation, ... all the coordination between every other aircraft," over the drop zone, he said. This included information about foreign aircraft coming in to drop with the US. Damron and his teammates "brought that all together to ensure that they could meet at one place at one time and execute the air drop."

The list of participating units and partners is long—so long that an Air Force spokesman said it is impossible to nail down exactly how many people participated in the relief effort. US Transportation Command, US Central Command, Air Mobility Command, AFCENT, 18th Air Force, 618th AOC (TACC), the 609th AOC (CAOC), Department of State,


*The airdrop missions ended after seven nights, and most of the Yazidis were able to leave the mountain. Here, a C-17 lands at al Udeid AB, Qatar, after a drop mission in August 2014.*

USAF photo by SSgt. Vernon Young Jr.

United States Agency for International Development, the government of Iraq, and the air forces of the United Kingdom and Australia all played a role.

That made for very long days in the CAOC, Damron said, but the airdrops would never have been approved if the airmen couldn't plan around the challenges.

"It was a very busy time," he said. "But everybody came together."

Planners added an additional C-130 on the fourth and fifth nights of the operation, and an additional C-17 for the sixth and seventh nights. Altogether, USAF flew nine C-17 missions and 16 C-130 missions, dropping bundles containing 35,397 gallons of water and 114,216 halal MREs—679,280 pounds of cargo—on Mount Sinjar over a seven-night stretch.

In an Aug. 11 briefing at the Pentagon, Army Lt. Gen. William Mayville Jr., director of operations for the Joint Staff, responded to questions about a possible safe corridor for the Yazidi refugees by saying the most important thing at that moment was to deliver water, shelter, and food to those still stranded on the mountain.

"We are, right now, gripped by the immediacy of the crisis, and our focus right now is to provide immediate relief to those that are suffering," he said. "We need to continue to sustain the humanitarian assistance, and we need to be able to protect that effort."

On Aug. 13, after six nights of airdrops, the US sent a handful of troops and a group of USAID personnel to assess the situation, DOD officials said at the time. The last airdrops took place that night.

The next day, then-Pentagon spokesman Rear. Adm. John Kirby told reporters there were "far fewer Yazidis trapped on Mount Sinjar than previously feared, and that's largely because of our successful humanitarian airdrops and US air strikes on [ISIS] targets."

## DO THE RIGHT THING

The airdrops, together with the nearby air strikes, allowed Kurdish Peshmerga troops to help the Yazidis leave the mountain, Kirby said, bringing the number of Yazidis there down to roughly 5,000—including about 2,000 who planned to stay there—thereby making an evacuation mission unnecessary.

"Those who remain on Mount Sinjar are in better condition than we previously thought they might be, and they continue to have access to the food and water that we have airdropped," he said.

Kirby said that Defense Secretary Chuck Hagel was "very proud that we've been able to effect this kind of change around Mount Sinjar, and in particular thanks to the skill and professionalism of our military personnel."

In a speech, Obama said the airdrops had helped the US military break ISIS' "siege of Mount Sinjar."

"We helped vulnerable people reach safety, and we saved many innocent lives," he said. "The bottom line is, is that the situation on the mountain has greatly improved and Americans should be very proud of our efforts. … I could not be prouder of the men and women of our military who carried out this humanitarian operation almost flawlessly."

Kirby said the mission was necessary because DOD believed "the risk of genocide was real."

"There was an imminent threat at the time to tens of thousands of people on that mountain," he said. "They're up against some pretty brutal people here, you know, beheading young kids and chasing down innocent women and children and slaughtering them."

Damron said everything went as planned during the airdrops, and all the bundles were dropped on target. It was his first time in a planning role as the weapons officer for a humanitarian aid mission, and he said it was rewarding to be able to put that training to use.

But the best part of the operation, he said, was "knowing that we were saving lives."

Homrig said he enjoyed being able to work with other services, countries, and aircraft on such an important mission.

"It really puts into perspective and unites people from different places, … and you get to do basically a good deed," he said. "The best moments of my career and my life have been when we've been able to directly impact and help those who are in dire need, both in the Philippines and [at Mount Sinjar]. … It's really giving hope to those who need it."

Homrig had deployed to Iraq several times previously, so he said, "To be able to help our friends out in Iraq and let them know that even though ISIL might be right in their face, that we are not deterred, … it's always a good feeling to do the right thing." ✪

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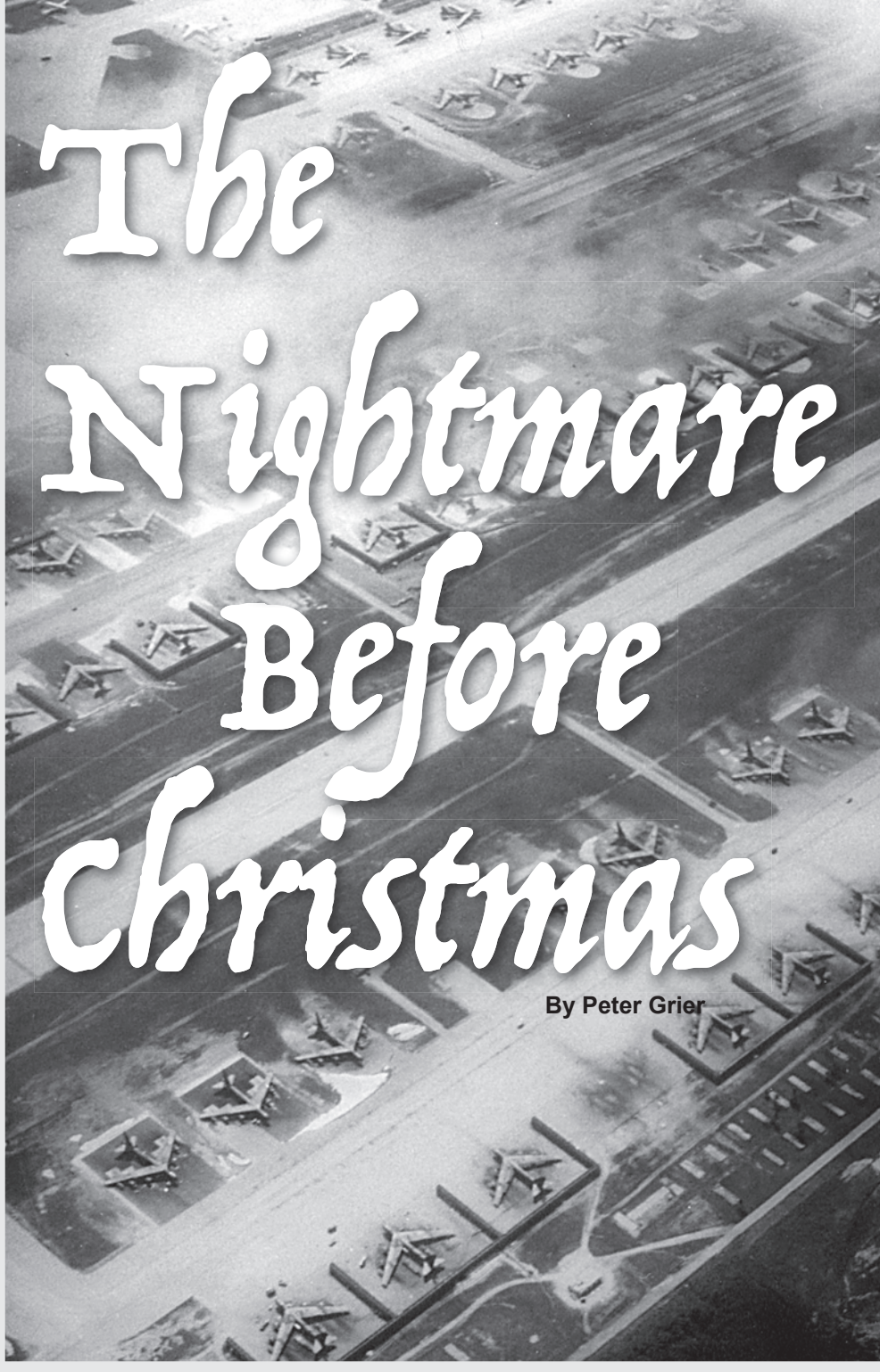
# The Nightmare Before Christmas

By Peter Grier



In the late afternoon of Dec. 26, 1972, Maj. William F. Stocker taxied his aging B-52D Stratofortress onto the runway at Guam's Andersen Air Force Base and stopped. Normally he and his fellow BUFF pilots made rolling takeoffs, turning the corner from the taxiway and roaring off into the tropical skies, but this time was different. Thousands of personnel had gathered to watch the launch. Stocker had asked for, and received, permission to taxi into place and hold for a moment.

As he sat there, seconds ticking away, Stocker and his fellow crew members looked out on perhaps the greatest armada of airpower assembled in any one place since the end of World War II. Other B-52s were stacked up nose-to-tail as far as he could see, waiting to follow him into combat. "It's difficult to describe the feeling of leading such an array of power," he later told an interviewer.

The last phase of Operation Linebacker II was about to begin. Days of intensive bombing had already inflicted heavy damage on North Vietnam. Rail yards and other transportation infrastructure had been devastated. Petroleum storage areas had been hard-hit, as had North Vietnamese airfields.

## DEADLY ATTRITION

The campaign, though, had not yet achieved its central purpose of driving Hanoi back to the negotiating table—and the Air Force had suffered devastating losses getting to that point.

The problem was the deadly network of SA-2 surface-to-air missiles that webbed the landscape around Hanoi and Haiphong. In a toll almost defying comprehension today—with B-52s still in regular front-line service—SA-2s downed 11 BUFFs and their crews in the first four nights of Linebacker II.

Air Force planners had predicted the possibility of such attrition, but its reality shocked everyone from the Oval Office to the flight lines of Southeast Asia. Something had to be done. The B-52 force was about to try something new: hitting North Vietnamese targets from different directions all at once, like a swarm of giant, angry hornets.

Near Hanoi, SA-2 units waited. The North Vietnamese had used a USAF bombing break over Christmas to stockpile missiles and compare methods of overcoming US jamming of their air defense radars. "Both sides knew that this night would be a test of wills," wrote Brig. Gen. James R. McCarthy, airborne mission commander for the Dec. 26 raid, and Lt. Col. George B. Allison, in the Air Force History Office monograph *Linebacker II*. At 4:18 p.m. local time, Stocker advanced the aircraft's throttles and rolled B-52, call sign Opal 1, down the runway. More than two hours later, the last of the line of 78 BUFFs from Andersen followed him into the air. Forty-two B-52Ds from U Tapao Royal Thai Air Base joined them in their attack.

Linebacker II was perhaps the most unique Air Force and Navy air campaign of the Vietnam War.

First, it was short. Its predecessor Linebacker I was the bombing of infrastructure around Hanoi and Haiphong from May to October of 1972. Linebacker II lasted only 11 days, however, from Dec. 18 to Dec. 29, 1972.

Second, it had a specific, political objective. The North Vietnamese had broken off peace talks in Paris. They appeared to be waiting for a new, more anti-war US Congress to take office in January; it might increase their negotiating leverage. President Richard M. Nixon and his National Security Advisor, Henry A. Kissinger, wanted a show of force to convince Hanoi to resume negotiations and sign a peace agreement close to the terms previously discussed.

USAF photo

*B-52s at Andersen AFB, Guam, during the runup to Operation Linebacker II.*

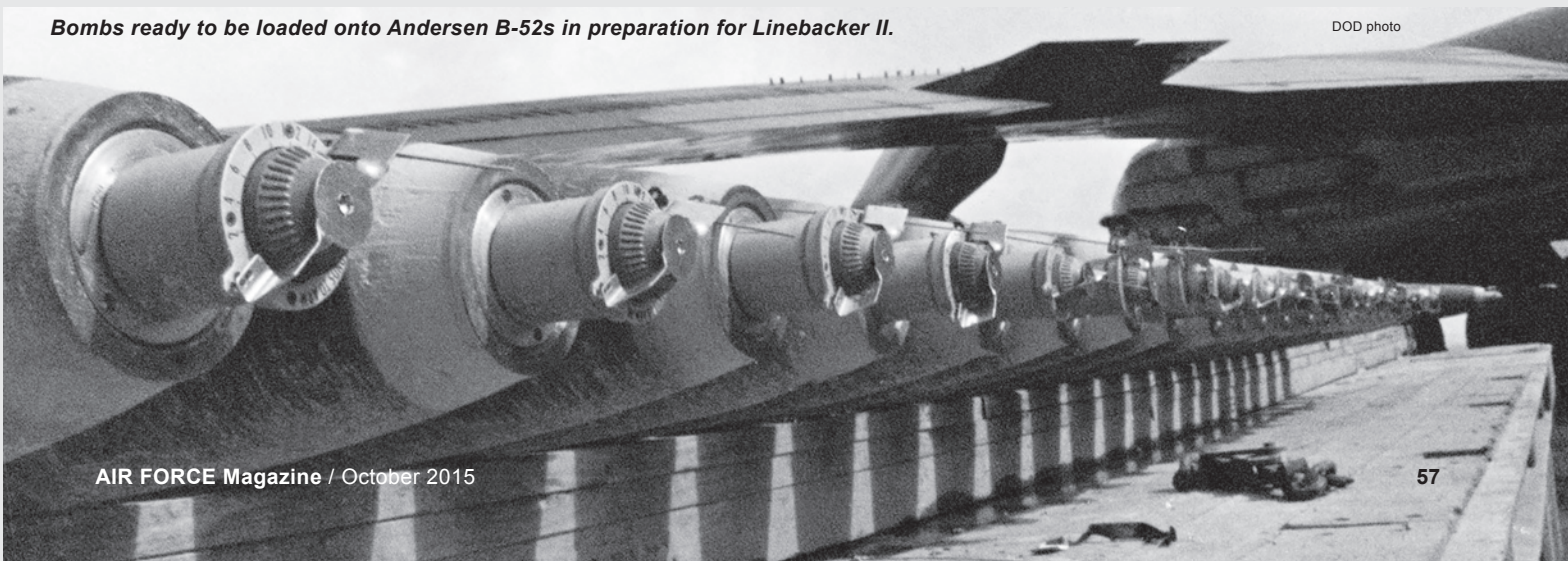
**The disastrous early days of Linebacker II forced the Air Force to find a new approach for B-52s against Hanoi.**

Third, it had few operational restrictions. Linebacker II was intended to exert maximum pressure by destroying major targets near Hanoi and the port city of Haiphong. That meant extended use of the biggest available stick in the Air Force arsenal: the B-52.

"The use of B-52s in large numbers was unprecedented, and the large-scale attacks on targets within 10 nautical miles of Hanoi represented a dynamic change in the employment of air resources," wrote Herman L. Gilster, a retired Air Force colonel and operations expert, in a 1991 Air University report. Some Air Force officials were eager to show what the B-52 could do in such a situation.

Nixon chose to unleash the B-52 force because he wanted to send a message to North Vietnam about US resolve. He believed the psychological impact of the big bomber was as important as its physical destructiveness. Since the BUFFs flew at more than 30,000 feet, those under attack typically couldn't see or hear the aircraft before bombs began exploding. Suddenly, the world around them would erupt as the carpet of high-explosives pummeled the earth. One high-ranking Viet Cong official who experienced a B-52 raid said he thought he'd been caught in the Apocalypse. "The terror was complete," said Truong Nhu Tang, who served as provisional justice minister during the war. "One lost control of bodily functions as the mind screamed incomprehensible orders to get out." Nixon wanted North Vietnamese civilians to understand that the US could unleash this power when it wanted.

The Joint Chiefs of Staff were "stunned" by the President's decision, wrote William P. Head, chief of the Warner Robins Air Logistics Center Office of History, in his 2002 book *War From Above the Clouds.* For years, air operations over Vietnam were hobbled by White House constraints on what targets



*Bombs ready to be loaded onto Andersen B-52s in preparation for Linebacker II.*

DOD photo

could be hit with what sort of weapons. Nixon was blunt about the implications of his choice. He told JCS Chairman Adm. Thomas H. Moorer, "This is your chance to use military power effectively to win this war, and if you don't, I'll consider you personally responsible."

As first envisioned by Nixon and the nation's military leaders, Linebacker II would be an all-out three-day effort to break Hanoi's will. A-7 attack aircraft and F-4 fighter-bombers would carry out daytime raids. B-52s, accompanied by F-111 strike aircraft and Air Force and Navy tactical air defenders, would fly the heavier nighttime operations.

How the Air Force would use the B-52s in conventional bombing runs remained an open question in mid-to-late 1972. The big bombers were assigned to Strategic Air Command as part of the US nuclear deterrent, and tactics and training were geared to this mission. The Single Integrated Operational Plan (SIOP) for war with the Soviet Union called for B-52s to penetrate Soviet airspace at low level, after US missiles had degraded Soviet air defenses. Given the awesome power of nuclear weapons, the crews were not called on to perform precision attack. All they needed to do was lob one bomb in the general area of a target, and the USSR was a large landmass with many military targets.

The situation in North Vietnam was very different. The B-52s would fly at high altitudes and use radar guided systems to drop conventional munitions. Destruction of a rail yard or power plant would entail placing weapons directly on target. Point defenses around the targets were formidable, including relatively modern Soviet-provided SA-2 SAMs. The defenders would also know the US airplanes were coming, as North Vietnam's lack of infrastructure meant there were not many B-52-worthy targets.

Eighth Air Force, headquartered on Guam, was in charge of bombing and refueling operations for Southeast Asia. In August 1972, anticipating more intense use of the B-52s over Vietnam, SAC commander Gen. John C. Meyer asked the 8th for ideas. In November, the 8th Air Force commander, Lt. Gen. Gerald W. Johnson, sent a draft plan for B-52 raids to SAC headquarters for final approval.

### LIMITING COLLATERAL DAMAGE

The plan called for simultaneous attacks against multiple targets in the Hanoi-Haiphong area. Waves of B-52s would come in from different directions in an attempt to confuse and defeat target defenses. SAC's Meyer rejected

## B-52 Crews Lost Over North Vietnam in Linebacker II

| Date | Aircraft | Call Sign | Crew Members | Position | Status |
|---|---|---|---|---|---|
| 12/18/72 | B-52G 58-0201 | Charcoal 1 | Lt. Col. Donald Ris | Pilot | KIA |
| | | | 1st Lt. Robert Thomas | Copilot | KIA |
| | | | Maj. Richard ohnson | Radar Navigator | POW, returned |
| | | | Capt. Robert Certain | Navigator | POW, returned |
| | | | Capt. Richard Simpson | EWO | POW, returned |
| | | | MSgt. Walter Ferguson | Gunner | KIA |
| 12/19/72 | B-52D 56-0608 | Rose 1 | Capt. Hal Wilson | Pilot | POW, returned |
| | | | Capt. Charles Brown | Copilot | POW, returned |
| | | | Maj. Fernando Alexander | Radar Navigator | POW, returned |
| | | | Capt. Richard Cooper | Navigator | KIA |
| | | | Capt. Harry Barrows | EWO | POW, returned |
| | | | SMSgt. Charlie Poole | Gunner | KIA |
| 12/20/72 | B-52D 56-0622 | Orange 3 | Maj. ohn Stuart | Pilot | Presumed dead |
| | | | 1st Lt. Paul Granger | Copilot | POW, returned |
| | | | Maj. Randolph Perry | Radar Navigator | KIA |
| | | | Capt. Thomas Klomann | Navigator | POW, returned |
| | | | Capt. Irwin Lerner | EWO | KIA |
| | | | MSgt. Arthur McLaughlin | Gunner | Presumed dead |
| 12/20/72 | B52-G 57-6496 | Quilt 3 | Capt. Terry Geloneck | Pilot | POW, returned |
| | | | 1st Lt. William Arcuri | Copilot | POW, returned |
| | | | Capt. Warren Spencer | Radar Navigator | KIA |
| | | | 1st Lt. Michael Martini | Navigator | POW, returned |
| | | | Capt. Craig Paul | EWO | KIA |
| | | | SSgt. Roy Madden | Gunner | POW, returned |
| 12/21/72 | B-52G 58-0198 | Olive 1 | Lt. Col. Keith Heggen | Deputy Mission CO | POW, died in captivity |
| | | | Lt. Col. ames Nagahiro | Pilot | POW, returned |
| | | | Capt. Donovan Walters | Copilot | KIA |
| | | | Maj. Edward ohnson | Radar Navigator | KIA |
| | | | Capt. Lynn Beens | Navigator | POW, returned |
| | | | Capt. Robert Lynn | EWO | KIA |
| | | | A1C Charles Bebus | Gunner | KIA |

this approach. His main concern was the possible, inadvertent bombing of civilians and collateral damage.

Back in Washington, the Nixon White House worried that such deaths would be used as propaganda against the US war effort, affecting public attitudes even in the United States itself. Meyer directed SAC planners to come up with their own approach.

In Omaha, they faced a tight deadline and drew up a simple, rigid plan. It entailed three waves of bombers traveling the same route each day, at the same altitude. To ensure accurate bombing, avoid midair collisions, and provide overlapping electronic countermeasures coverage, bombers would have to stabilize flight four minutes before bomb release. After release all aircraft would make the same turn exiting the target area and avoid further SAM exposure.

*North Vietnamese soldiers and members of the press crawl over the wreckage of a B-52 shot down northwest of Hanoi during Linebacker II.*

| Date | Aircraft | Call Sign | Crew Members | Position | Status |
|---|---|---|---|---|---|
| 12/21/72 | B-52G 58-0169 | Tan 3 | Capt. Randall Craddock | Pilot | KIA |
| | | | Capt. George Lock art | Copilot | KIA |
| | | | Maj. Bobby Kirby | Radar Nav gator | KIA |
| | | | 1st Lt. Charles Darr | Nav gator | KIA |
| | | | Capt. Ronald Perry | EWO | KIA |
| | | | SSgt. a mes Lollar | Gunner | POW, returned |
| 12/22/72 | B-52D 55-0050 | Blue 1 | Lt. Col. o hn Yuill | Pilot | POW, returned |
| | | | Capt. Dave Drummond | Copilot | POW, returned |
| | | | Lt. Col. Lou Bernaso ni | Radar Nav gator | POW, returned |
| | | | 1st Lt. William Mag ll | Nav gator | POW, returned |
| | | | Lt. Col. William Conlee | EWO | POW, returned |
| | | | SSgt. Gary Morgan | Gunner | POW, returned |
| 12/22/72 | B-52D 56-0061 | Scarlet 3/1 | Capt. Peter Giroux | Pilot | POW, returned |
| | | | Capt. Thomas Bennett | Copilot | Pres med dead |
| | | | Lt. Col. Gerald Alley | Radar Nav gator | KIA |
| | | | 1st Lt. o e ph Copack | Nav gator | KIA |
| | | | Capt. Peter Camerota | EWO | POW, returned |
| | | | MSgt. Louis LeBlanc | Gunner | POW, returned |
| 12/26/72 | B-52D 56-0674 | Ebony 2 | Capt. Robert Morris | Pilot | KIA |
| | | | 1st Lt. Robert Hudso n | Copilot | POW, returned |
| | | | Capt. Michael LaBeau | Radar Nav gator | POW, returned |
| | | | 1st Lt. Duane Vav och | Nav gator | POW, returned |
| | | | Capt. Nutter Wimbrow | EWO | KIA |
| | | | TSgt. a mes Cook | Gunner | POW, returned |
| 12/28/72 | B-52D 56-0605 | Cobalt 2/1 | Capt. Frank Lewis | Pilot | POW, returned |
| | | | Capt. Samuel Cus mano | Copilot | POW, returned |
| | | | Maj. a mes Condon | Radar Nav gator | POW, returned |
| | | | 1st Lt. Bennie Fre r | Nav gator | KIA |
| | | | Maj. Allen o hnso n | EWO | KIA |
| | | | MSgt. a mes Gough | Gunner | POW, returned |

Source: *B-52 Stratofortress Units in Combat, 1955-73*, by o n Lak (with updates)

Staffers at 8th Air Force were "alarmed by this repetitive routing," according to historian Head. Some predicted the casualty rate could run as high as 18 percent. SAC estimated losses would be much lower—possibly three percent, using data derived from its SIOP-based predictive models.

The Linebacker II campaign began somewhat auspiciously. On the night of Dec. 18, 129 B-52D and B-52Gs hit North Vietnam (87 bombers flying from Andersen alone), flying more than 3,000 miles before reaching their targets. The rest came from U Tapao. Thirty-nine joint service aircraft provided fighter escorts, radar jamming and countermeasures, and Wild Weasel SAM suppression.

The first wave of B-52s struck at 7:45 p.m. Pilots flew a route west to east near the China-Vietnam border and turned southeast for their bombing runs. They approached targets in three-bomber cells, separated by about 10 minutes—a procession dubbed the "elephant walk." Four minutes prior to bomb release they flew straight and level as required, turning west after release in an attempt to avoid SAM sites.

The second wave attacked at midnight along the same general route, employing the same tactics. The third wave came at 5 a.m. The first-night forces slammed seven carefully selected targets: three fighter bases, the railway yards at Yen Vien, a vehicle repair and warehouse facility at Kinh No, a railway repair facility in Hanoi, and propaganda broadcaster Radio Hanoi.

Initial damage assessment reports were encouraging, with 94 percent of aircraft hitting their assigned targets.

Counting against this success was the loss of three bombers—one aircraft was shot down in each wave—to North Vietnamese SAMs. Five crew members were killed in action, seven became prisoners of war, and one seven-man crew was recovered. US officials blamed high winds in the target area for some of the B-52 vulnerability. The headwind greatly slowed the bomber's egress flights and dispersed the BUFF's radar-confusing metallic chaff.

The second night of bombing was more successful. Ninety-three B-52s hit targets near Hanoi using the same approach and tactics. Two were damaged but none were downed.

Still, the ferocity of SAM launches near the targets shocked aircrews. Hundreds of "flying telephone poles" peppered the skies each night, but the loss rate was acceptable and the tactics seemed to be working.

"A false sense of security set in," Earl Tilford Jr. wrote in his book *Crosswinds.* That false sense exploded on the third day of the campaign.

On Dec. 20, six B-52s were shot down and another was severely damaged, within nine hours, resulting in 16 airmen killed in action and nine becoming POWs. The repercussions were felt in theater, at SAC headquarters, and at the White House itself.

Before the day's mission, worries about the inflexibility and repetitiveness of the flight routes had trickled through the B-52 force. Aircrew were unhappy about the post-target turn for a similar reason: SAM sites could reasonably anticipate the maneuver and adjust their aim accordingly. Staff from 8th Air Force asked SAC to allow crews to maneuver until just prior to weapon release and alter ingress and egress routes to avoid establishing patterns.

## DAY THREE

SAC officials were well-aware by this point that small changes in course, speed, and timing made a difference in vulnerability to SA-2s, and accordingly shortened the period B-52s were required to fly steady prior to weapons release. Given the relative success of Linebacker II to this point and the lag in instituting tactical changes, SAC essentially opted to go with the existing plan. "Day Three's missions could best be described as a composite of routes, targets, and tactics from Days One and Two," wrote McCarthy and Allison.

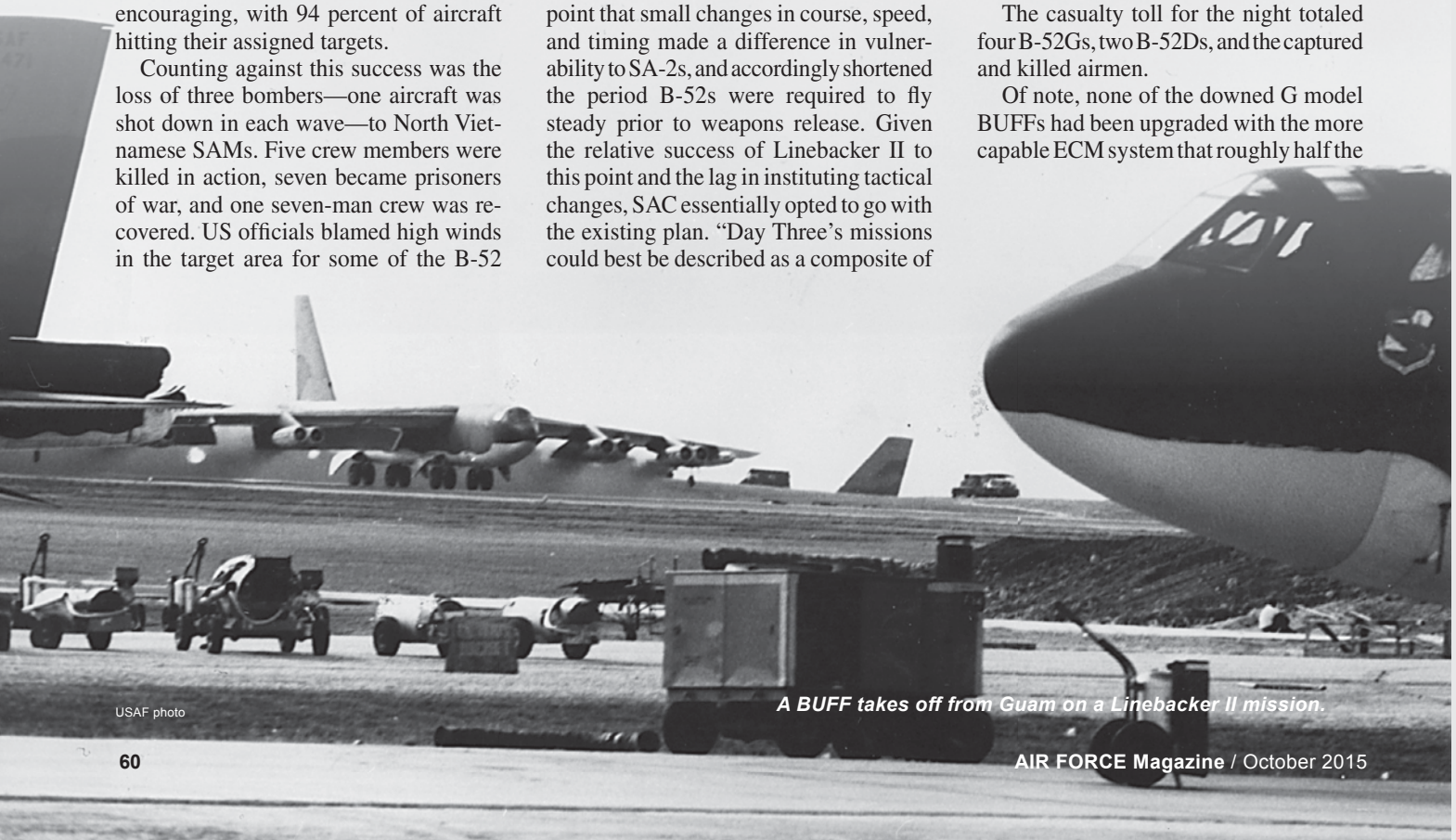
The first wave of Day Three B-52s again approached the Hanoi area from a narrow northwest window. Of the 11 three-ship cells in the wave, nine were directed against a target that had been attacked previously, the Yen Vien railroad yards and surrounding area. SAM activity in the area had been muted the previous night but not on Dec. 20. The first cell, call sign Quilt, lost Quilt 3 to an SA-2 that struck the bomber on its post-target turn. Two cells made it through safely. A second B-52—Brass 2—was hit and heavily damaged making the same turn, and its crew abandoned ship on reaching Thai airspace. Two more cells dropped their bombs without loss. Then two missiles hit Orange 3. It exploded just before bomb release.

The second wave hours later was more fortunate. No aircraft were shot down and none received heavy damage.

Then came wave three, "the second half of the nightmare," according to McCarthy and Allison. A SAM hit Straw 2, the fifth aircraft of the wave, on the turn. It was abandoned over Laos, and most of its crew was rescued. Only a few minutes later Olive 1 went down, destroyed after bomb release. The majority of its crew became POWs. Tan 3 lost its bombing and navigation radar and struggled to keep up with its cell. Several SAMs hit the airplane as it neared the target. Only the gunner managed to bail out before the bomber exploded.

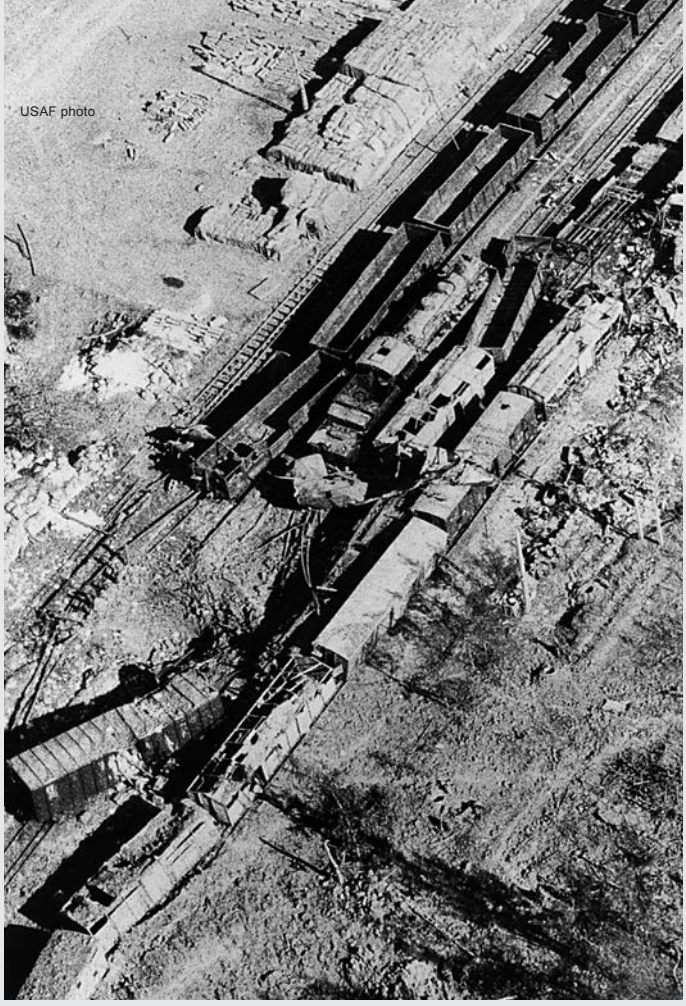
The casualty toll for the night totaled four B-52Gs, two B-52Ds, and the captured and killed airmen.

Of note, none of the downed G model BUFFs had been upgraded with the more capable ECM system that roughly half the



USAF photo

*A BUFF takes off from Guam on a Linebacker II mission.*




***A supply train lies in ruins seven miles north of Hanoi after a B-52 strike on Dec. 27, 1972.***

Gs in the region had received. Four of the losses and the one damaged aircraft were hit in the post-target turn.

By now Nixon had already extended Linebacker II indefinitely. If the B-52s were going to continue "going downtown" and attacking Hanoi, a change of tactics was clearly needed. The bomber losses were weighing on Nixon himself. In his diary, White House Chief of Staff H. R. Haldeman recorded the "P's" anguish over the rate that B-52s were being destroyed.

"The P is obviously very concerned about the reaction on the B-52s," wrote Haldeman in his diary entry for Dec. 20, 1972.

The B-52 commander at U Tapao, Brig. Gen. Glenn R. Sullivan, was unhappy with the casualties his force was incurring and decided to pressure higher headquarters for changes. He polled seven or eight crews to get their ideas on how to improve tactics. They quickly coalesced around a few general recommendations: Change the inbound routes, change the attack altitudes, get rid of the post-target turn, egress out to the Gulf of Tonkin, and increase the use of chaff. Sullivan sent a message directly to SAC commander Meyer, bypassing his boss, the head of 8th Air Force, Johnson.

Johnson eventually received a copy of the recommendations, passed it to the wing commanders, and sent a note to SAC agreeing with the proposed changes. "If there was a single hero of ... Linebacker II it was General Sullivan, a man who exhibited real moral courage—the willingness to express unpopular views and say what needs to be said," wrote historian Marshall L. Michel III in his book *The Eleven Days of Christmas.* JCS Chairman Moorer also called SAC to ask what they would do to stem the carnage.

Linebacker II continued, but at a reduced pace, on Dec. 21. Only 30 B-52Ds from U Tapao, older models, all carrying upgraded ECM equipment, conducted strikes. Two more BUFFs were lost—one at bomb release, another after its bombing radar failed and it became separated from its cell.

The Air Force had now lost 11 B-52s in less than a week. US Air Force leaders, including SAC's Meyer, recognized that this erosion of a central part of the US strategic force could not continue. "On the 22nd, Meyer directed planners to change tactics and create plans for a new kind of raid for the 26th," wrote Head in *War From Above the Clouds.*

Stocker had been the first Andersen B-52 pilot into the air on Linebacker II's first day. On Dec. 26, he led Andersen's force into the air again. It was the day on which the airpower campaign, and perhaps the future of the US in Vietnam, depended. Nixon had ordered a 36-hour bombing respite over the Christmas holiday. He added a guarantee to North Vietnam: He'd halt the bombing over the 20th parallel for good if they agreed to resume peace negotiations.

To try to convince Hanoi this was the wisest course, SAC and 8th Air Force drew up a new plan of action for the day bombing resumed. After a frenzy of cross-communication and discussions and planning and replanning, officials agreed to shake up tactics while compressing the entire operation. They were going to take a package of bombing attacks as intense as that of Linebacker II's first night—and unleash it in 15 minutes instead of eight hours.

On the day after Christmas, 120 B-52s hit a variety of targets almost simultaneously. Four waves of 72 bombers each penetrated Hanoi's airspace from four directions, striking four targets. At the same time, two waves of 15 bombers attacked Haiphong, each approaching from a different point on the compass. Other waves hit rail yards north of Hanoi proper.

The North Vietnamese had used the 36-hour break to stockpile more SAMs. Resistance was intense. McCarthy, aboard Stocker's aircraft, said that from his vantage point, it appeared the defenders were barraging SA-2s into the air as if they were anti-aircraft shells, trying to create a curtain of metal and high explosives to force the B-52s off course.

"After 26 SAMs, I stopped counting. They were coming up too fast. ... At bombs away, it looked like we were right in the middle of a fireworks factory that was in the process of blowing up," he recounted in his monograph.

Two more B-52s went down, but the swarm of bombers overwhelmed the North Vietnamese defense system.

From a political point of view, the mission was a complete success: Before the end of the night on the 26th, Washington received a message from Hanoi condemning the "extermination bombing" and offering to resume peace talks on Jan. 8. Strikes continued for three more days.

Nixon ordered an end to the bombing after Hanoi agreed to a final demand to begin preliminary talks on Jan. 2.

On Jan. 27, 1973, Secretary of State William P. Rogers signed a peace deal with the North Vietnamese. The release of US prisoners of war began on Feb. 12.

"When the history of airpower in Southeast Asia is finally written, the raid flown on 26 December 1972 by the B-52s and their support forces will, I suspect, be judged one of the most successful bombing missions of the war," wrote McCarthy after Linebacker II's end. ✪

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*Peter Grier, a Washington, D.C., editor for the* Christian Science Monitor, *is a longtime contributor to* Air Force Magazine. *His most recent article, "Heroism From the Hip," appeared in June.*

# Th
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**J. Robert Oppenheimer and his colleagues opposed development of the hydrogen bomb.**

In the years immediately following World War II, the United States was the only nation with the atomic bomb. Its strategic dominance, however, rested on a thin veneer of actual military capability.

As late as 1947, the US did not have any atomic bombs assembled and ready for use. The Atomic Energy Commission, which held custody, was to work up the bombs and transfer them to the Air Force if and when they were needed. The Air Force had only a few airplanes, "Silver Plate" B-29s, that could deliver the bomb, and few trained crews.

The leading atomic scientists who developed the atomic bomb during the war had left the Los Alamos weapons laboratory in New Mexico. Most of them were opposed to further military development of atomic energy.

The US in 1946 proposed international control of atomic weapons. The offer to the United Nations fell through because the Soviets demanded the US eliminate its nuclear weapons as a precondition to agreement.

***The first thermonuclear explosion was the "Ivy Mike" test at Eniwetok Atoll in the Pacific in 1952. The fireball was three miles wide and vaporized the coral islet on which the shot occurred.***

# e per

By John T. Correll

The concept for a far more powerful nuclear weapon—the hydrogen bomb, called the "Super" by the atomic scientists—had been around for some time. Few outside of the scientific community knew about it, and except for a few scattered advocates, there was almost no interest in pursuing it.

Until October 1949, the President of the United States had never heard of the hydrogen bomb, nor had the Joint Chiefs of Staff. Disclosure beyond the scientific inner circle was brought about by dramatic events and a few determined insiders.

The Soviet Union exploded a nuclear device, "Joe 1," Aug. 29, 1949. It was an exact copy of the "Fat Man" atomic bomb dropped on Nagasaki, Japan. British scientist Klaus Fuchs, arrested in London, admitted in January 1950 that he had passed atomic secrets, stolen at Los Alamos, to the Soviet Union.

President Truman, informed that a hydrogen bomb was possible and advised that the Soviets might not be that far behind, ordered a development program into high gear. The United States did not yet know that the Soviet Union had been working on a hydrogen bomb since 1948, aided by research obtained by espionage from Los Alamos.

## AT EASE

An atomic or fission bomb is exploded by bringing enhanced uranium or plutonium to critical mass. A hydrogen or fusion bomb is a two-stage device. The primary stage is an atomic bomb, which acts as a trigger, aided by another atomic "spark plug" in the secondary stage, to compress and ignite hydrogen isotopes. The thermonuclear chain reaction thus induced releases 1,000 times more energy than an atomic bomb.

The Manhattan Project team at Los Alamos was aware of the theory that an atomic bomb might be able to detonate a fusion explosion. However, with time pressures of the war bearing down on them, they chose to concentrate on the fundamental task of producing an atomic bomb, a formidable challenge in itself.

Physicist Edward Teller, the foremost advocate of the Super, was permitted to conduct theoretical fusion research as a minor effort at Los Alamos, but lab director J. Robert Oppenheimer kept the project's emphasis on the atomic bomb, which was tested successfully in July 1945. The clash between Teller and Oppenheimer would continue spectacularly over the next 10 years.

When World War II ended, the United States felt secure in its military superiority and had no inclination to develop more powerful weapons—or to take an adversarial position toward its wartime ally, the Soviet Union.

In his famous speech at Westminster College in Fulton, Mo., in March 1946, Winston Churchill warned that an "Iron Curtain" had descended on Europe. It is seldom remembered that the speech was poorly received at the time. *The New York Times* reported that President Truman had no comment and the prevailing opinion in Congress and "in the high councils of the Administration" was that Churchill had been excessively provocative toward the Soviet Union.

In June 1946, the United States offered to give up its store of atomic weapons and turn its atomic secrets over to a proposed UN International Atomic Development Authority, which would use atomic energy for peaceful purposes. It might have been accepted if the Soviet Union had not refused to concede veto power in the UN on atomic issues. The international control issue bubbled along into 1948, but it was essentially over.

***Edward Teller, the foremost advocate of the hydrogen bomb, could not get his "Classical Super" to work. Detonation of a thermonuclear device, it was subsequently learned, required compression of the fission fuel, not just high levels of heat.***

Oppenheimer wrote and spoke often in favor of international handling of atomic energy and open communication on science. "We vastly overestimate the value of secrecy and underestimate the corrosive effects of it," he said.

The Atomic Energy Act of 1946 transferred control and custody of nuclear weapons from the military to the new Atomic Energy Commission. The first AEC chairman was David E. Lilienthal, an ardent New Dealer, head of the Tennessee Valley Authority, and an implacable foe of the Super, which he regarded as dangerous and unnecessary.

Most of the AEC commissioners sided with Lilienthal. The exception was Lewis Strauss, a former investment banker, a rear admiral in the Navy Reserve, and a hard-nosed Cold Warrior. He, along with Teller, Oppenheimer, and Lilienthal would figure prominently in the melodrama to come.

The armed forces were not particularly worried about nuclear weapons. Military intelligence did not expect a challenge to the US monopoly. The Navy predicted the Soviets would not have the bomb until 1965. The Army guessed 1960; the Air Force said by 1952.

In January 1949, the AEC nuclear stockpile reached 56 atomic bombs.

## TRUMAN'S DECISION

The Soviet atomic bomb test in August 1949 was discovered soon thereafter by the United States and announced to the world by President Truman on Sept. 23. The surprise set off renewed interest in the hydrogen bomb by the AEC and in Congress by the Joint Committee on Atomic Energy.

At an AEC meeting Oct. 5, Strauss distributed a memo to his fellow commissioners proposing a "quantum jump" in nuclear capability and "an intensive effort to get ahead with the Super."

It was the first clear proposal for the hydrogen bomb.

Lawrence Livermore National Laboratory photo

Department of Energy photo

***J. Robert Oppenheimer, who led the development of the atomic bomb, was opposed to the hydrogen bomb. He was stripped of his security clearance by the AEC in 1954 because of his continued association with Communists and a casual attitude toward information security—although animosity from those who disliked him likely played a part as well.***


***President Eisenhower takes a briefing from Lewis Strauss, AEC chairman, on the hydrogen bomb tests in 1954. Strauss distrusted Oppenheimer.***

Strauss then met with the executive secretary of the National Security Council and instigated the first notice to Truman of the possibility of a hydrogen bomb. The Joint Chiefs of Staff were let in on the secret the following week. It became public knowledge in November when Sen. Edwin C. Johnson (D-Colo.) revealed on a local television broadcast in New York that American scientists were trying to make a "super bomb" many times more powerful than the atomic bomb.

AEC chairman Lilienthal responded by calling in the Commission's General Advisory Committee, which was chaired by Oppenheimer. The committee members were atomic scientists stridently against a hydrogen bomb. After a two-day meeting, they produced a report on Oct. 30 saying that all-out development of the hydrogen bomb would be "wrong."

In remarkably harsh language, Oppenheimer and the GAC said that "a super bomb might become a weapon of genocide," represented "a threat to the future of the human race," and that "a super bomb should never be produced." In the opinion of the GAC, "the extreme dangers to mankind inherent in the proposal outweigh any military advantage that could come from this development."

By that time, Truman had heard directly from Strauss, who urged him to give the highest priority to H-bomb development. The Joint Chiefs of Staff agreed with Strauss. Truman sought further advice from a special committee consisting of Lilienthal, Secretary of State Dean Acheson, and Secretary of Defense Louis A. Johnson. Acheson and Johnson advised Truman to proceed with the Super.

Speculation in the press was inflamed by the news from Britain that physicist Fuchs had confessed to passing atomic and hydrogen secrets to the Soviet Union. Fuchs had been a British representative at Los Alamos and had seen all of the research in the archives there on thermonuclear weapon research.

Truman made his decision Jan. 31, 1950. He asked Acheson, Johnson, and Lilienthal whether the Soviets could develop a hydrogen bomb. They agreed that the Soviets probably could. "In that case, we have no choice," Truman said. "We'll go ahead."

Congress gave Truman overwhelming approval, across party lines, for his decision, but the atomic scientists and many in the news media disagreed vehemently. Lilienthal resigned, as he had planned to do anyway.

Truman's decision gained additional credibility that summer when the FBI arrested Julius and Ethel Rosenberg and other members of a Soviet spy ring that had stolen atomic secrets from Los Alamos during the war.

## THE DESIGN THAT WORKED

Edward Teller struggled through the postwar years but could not get his design for the "Classical Super" to work. He assumed, erroneously, that the heat from an atomic device alone would be enough to ignite fusion.

In 1950, mathematician Stanislaw Ulam, using new high speed computers, discovered a mistake made by Teller and his associates in 1946. Direct ignition would take an impractical amount of tritium, one of the hydrogen isotopes in the fission fuel, if it would work at all.

Ulam said Teller "was not easily reconciled" to the report of the error but "warmed" to the idea of a "staged" approach when Ulam suggested it in January 1951. In March, Teller and Ulam wrote a classified paper on a new concept, in which an atomic bomb might ignite a secondary explosion in fission fuel located separately from the atomic trigger in the hydrogen bomb casing.

Detonation of the thermonuclear fuel would require compression as well as heat. Teller improved the idea by adding a second atomic component as a "spark plug" in the second stage of the process. Thus, embedded within the hydrogen bomb were the atomic bomb trigger and the atomic spark plug in a separate cylinder.

The revised configuration was ultimately successful, but to Teller's displeasure, it was called the "Teller-Ulam design." Teller resented Ulam's contribution being accorded equal credit with his own previous 10 years of work and said that the final configuration had been his. Nevertheless, the Teller-Ulam designation stuck and went on to be used in almost all modern nuclear weapons by all of the major nuclear powers.

## IVY MIKE

The first successful explosion of a hydrogen device was the "Ivy Mike" test Nov. 1, 1952, in the Marshall Islands, a remote section of the Pacific about 1,200 miles east of Guam. The device weighed 82 tons and was essentially more a building than a bomb. It was constructed on Elugelab, one of 40 coral islets in the Eniwetok Atoll.

After the war, the United States had designated Eniwetok, along with the Bikini Atoll, for testing of nuclear weapons and the native inhabitants had been relocated. Observers watched the Ivy Mike test from various islands a safe distance away.

Ivy Mike detonated with a thermonuclear yield of 10.4 megatons, a thousand times more powerful than the "Little Boy" bomb at Hiroshima, and vaporized Elugelab. "Once the explosion broke through the casing, it expanded in seconds to a blinding white fireball more than three miles across (the Hiroshima fireball had measured little more than one-tenth of a mile) and rose over the horizon like a dark sun," said Richard Rhodes, author of *Dark Sun: The Making of the Hydrogen Bomb.* "The crews of the task force, 30 miles away, felt a swell of heat as if someone had opened a hot oven, heat that persisted long enough to seem menacing."

The first thermonuclear test by the Soviets, "Joe 4," came less than a year later. They evacuated tens of thousands of people from Semipalatinsk in northeastern Kazakhstan, mounted a bomb the size of the US "Fat Man" atomic bomb atop a tower, and touched it off for a modest yield of 400 kilotons in August 1953.

More tests followed on both sides. The highest yield ever achieved by a US device, 15 megatons, was the "Castle Bravo" shot at Bikini in March 1954. The fireball was nearly four miles wide. The Soviets dropped a 1.6 megaton bomb from a Tu-16 bomber in November 1955.

Soviet leader Nikita Khrushchev gloated that his nation had been first to explode a hydrogen bomb from an airplane. The previous US explosion, he said, "was not a hydrogen bomb but a hydrogen installation." The United States dropped its first H-bomb from an airplane in May 1956.

## OUSTING OPPENHEIMER

Strauss became director of the AEC in July 1953. The stage was set for the final showdown with Oppenheimer, who was regarded by many in the AEC and the Pentagon as a security risk.

By then, Oppenheimer was director of the Institute for Advanced Study in Princeton, N.J., and no longer on the GAC but he was a consultant under contract to the AEC. In that capacity, he routinely got copies of classified reports from all AEC divisions. His consultancy was to expire in 1954 and his security clearance had to be renewed if the contract was to be extended.

The question of his security clearance was not strictly a matter of loyalty. It also had to do with his casual attitude toward information security, an issue on which he and Strauss had tangled before. Oppenheimer's continued association with known Communists was also a concern.

Some of it was old news. Oppenheimer's wife and brother had been members of the Communist Party in the 1930s. Oppenheimer described himself as a "fellow traveler" who contributed money to Communist causes until 1942. His qualifications to be scientific director of the Manhattan Project had overridden concerns about his previous activities.

After that, however, Oppenheimer generated new questions about his judgment and veracity with conflicting accounts in 1943 and 1946 of his dealings with Hakkon Chevalier, a friend and fellow member of the faculty at Berkeley. In 1943, Chevalier tried to recruit Oppenheimer to provide technical information to the Soviet Union. Oppenheimer delayed for months telling Manhattan Project security about it and then said the approach was by an unknown stranger. He later acknowledged to the FBI that the Soviet agent had been Chevalier.

Oppenheimer's pattern of conduct led Air Force leaders in 1951 to order that he not be used as a consultant or given classified information. Strauss had deeper doubts and thought Oppenheimer might be "another Fuchs." In November 1953, a former staff director of the Joint Congressional Committee on Atomic Energy wrote to the FBI saying that Oppenheimer was not trustworthy.

With these allegations swirling about in 1953, Oppenheimer made the situation infinitely worse by visiting his old friend Chevalier in Paris and going to dinner with him. To Oppenheimer's mind, Chevalier's politics were harmless, but US officials were enraged. President Eisenhower cut off Oppenheimer's access to atomic secrets and the AEC suspended his clearance in December 1953.

A special AEC Personnel Security Board held hearings, taking testimony from Oppenheimer and others over a period of two months. Among those testifying was Edward Teller, who

*Truman, shown here on a tour of Andrews Field, Md., with Air Force escorts, had never heard of a hydrogen bomb until October 1949. He decided that the United States had "no choice" except to proceed with development.*

said Oppenheimer had continually used his influence to slow down work on the hydrogen bomb. Teller did not accuse Oppenheimer of disloyalty but said he "would feel personally more secure if public matters would rest in other hands."

In May 1954, the Personnel Security Board recommended against the reinstatement of Oppenheimer's clearance. Oppenheimer appealed to the full AEC, which concurred in June with stripping him of his clearance.

Oppenheimer, who had gotten favorable press throughout his ordeal, won the battle for public opinion. The standard interpretation is that he was unfairly ousted by vindictive enemies on the political right. For the rest of his life, Oppenheimer was a cult figure and something of a folk hero. Strauss and Teller became pariahs.


USAF Photo

***The B53 thermonuclear bomb display at the National Museum of the US Air Force in Dayton, Ohio.***

## THE HYDROGEN ERA

Strictly speaking, the "Atomic Age"—much heralded at the time—did not last long. Ten years after the first atomic test in the New Mexico desert in 1945, the atomic bomb had been all but superseded by the hydrogen bomb.

The armed forces, which had been shut out of nuclear affairs by the AEC, gained a stronger hand. On several occasions, President Truman transferred a number of complete bombs to military control although AEC and the State Department convinced him not to make it a regular policy. In 1956, Eisenhower gave the Defense Department custody of nuclear weapons whenever an emergency was declared, and in 1959 released all operational bombs and warheads outright to the military.

Advancing technology made hydrogen bombs smaller and more powerful, leading to warheads that were light enough to be delivered by an ICBM as well as an airplane. Eventually, the Mark 12-A thermonuclear warhead used on Minuteman missiles would be less than six feet long and weigh about 700 pounds.

A casing of the Mark 53 hydrogen bomb, deemed "an enduring symbol of the Cold War," is on display at the National Museum of the US Air Force in Dayton, Ohio. It weighed 9,000 pounds, generated a yield of nine megatons, and was carried by B-47, B-52, and B-58 bombers. The Titan ICBM delivered a modified version.

The public learned a new word: fallout, referring to radioactive particles gathered up by a nuclear explosion and carried around the world by upper air currents. There was not enough fallout from atomic bombs to make it a major problem, but hydrogen bombs, with fireballs four miles wide, scooped up massive amounts of dirt, sand, and dust.

As the AEC explained it to the newspapers, fallout from a hydrogen bomb explosion over Washington, D.C., would reach almost to New York and be potentially lethal to the entire population within the first 140 miles. This led to the civil defense boom of the 1950s and 1960s, with many families building fallout shelters in the backyard.

The Super became an issue in the 1956 presidential election with Eisenhower's Democratic challenger Adlai Stevenson proposing that the United States stop further tests of the hydrogen bomb. He said the Soviet Union would be willing to join in such a policy. His running mate, Sen. Estes Kefauver (D-Tenn.), said it was "general information" that a hydrogen bomb could "blow the Earth off its axis by 16 degrees." According to *The New York Times,* "responsible scientists" found Kefauver's claim "incredible."

Eisenhower, who said the Stevenson's plan was "pie-in-the-sky promises and wishful thinking," won the November election by a landslide.

Khrushchev, in his customary fashion, said the USSR would soon "have a guided missile with a hydrogen bomb that can fall anywhere in the world."

## LEGACY OF THE SUPER

Critics of the hydrogen bomb in the 1950s said that it had no military value other than an imputed psychological effect that might to some extent restrain an adversary. The point was correct but that imputed effect—known as deterrence—kept the nuclear peace until the Cold War ended some 40 years later.

The terms "atomic bomb" and "hydrogen bomb" are seldom used today, except in a historical context. The standard reference is to "nuclear weapons," without differentiation between fission and fusion devices.

Almost all of the nuclear weapons in the hands of the major powers at present are of thermonuclear design because it is more efficient. Thermonuclear bombs, of course, use atomic bombs as triggers for detonation, just as Ivy Mike did.

The British tested a thermonuclear device in 1958, followed by China in 1967, France in 1968, and India in 1998. Israel is presumed to have the hydrogen bomb.

Pakistan has not tested a thermonuclear device, but could probably do so with a determined effort.

In 2014, North Korea said its scientists had achieved nuclear fusion, but the claim was generally discounted.

For some years, the United States continued to deploy atomic weapons for tactical use, but the last atomic bomb in the US inventory, the B57, was removed from service in 1993. ✪

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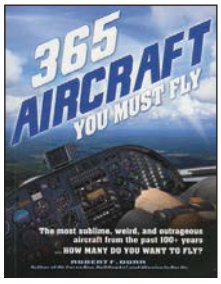
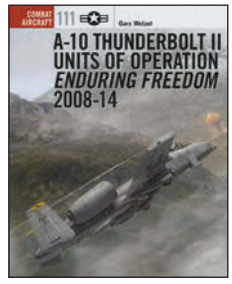
*John T. Correll was editor in chief of* Air Force Magazine *for 18 years and is now a contributor. His most recent article, "Opposing AWACS," appeared in the September issue.*

# Books

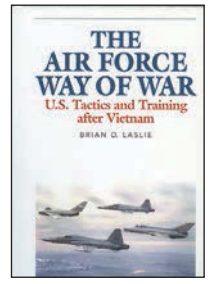
**Compiled by Chequita Wood,** Media Research Editor



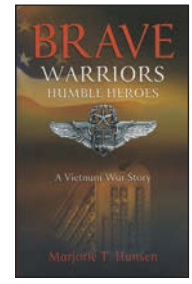

***365 Aircraft You Must Fly: The Most Sublime, Weird, and Outrageous Aircraft From the Past 100+ Years ... How Many Do You Want to Fly?*** *Robert F. Dorr. Zenith Press, Minneapolis (800-458-0454). 319 pages. $22.99.*



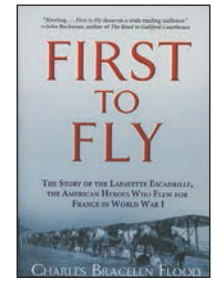

***A-10 Thunderbolt II: Units of Operation Enduring Freedom, 2008-2014.*** *Gary Wetzel, Osprey Publishing, New York (800-726-0600). 91 pages. $22.95.*



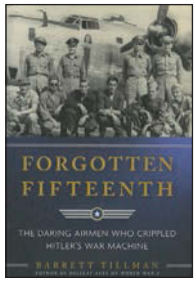

***The Air Force Way of War: US Tactics and Training After Vietnam.*** *Brian D. Laslie. University Press of Kentucky, Lexington, KY (800-537-5487). 237 pages. $30.00.*




***Brave Warriors, Humble Heroes: A Vietnam War Story.*** *Marjorie T. Hansen, Brown Books, Dallas (972-381-0009). 229 pages. $22.95.*




***First To Fly: The Story of the Lafayette Escadrille, The American Heroes who Flew for France in World War I.*** *Charles Bracelen Flood, Atlantic Monthly Press, New York (800-343-4499). 242 pages. $25.00.*

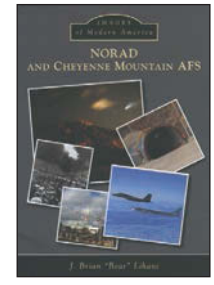



***Forgotten Fifteenth: The Daring Airmen Who Crippled Hitler's War Machine.*** *Barrett Tillman. Regnery Publishing, Washington, DC (800-343-4499). 338 pages. $29.99.*

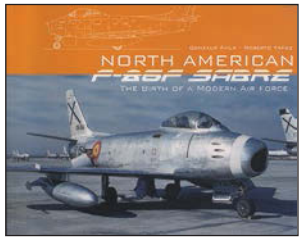

***The Future of Land Warfare. Michael E. O'Hanlon.*** *Brookings Institution Press, Washington, DC (800-537-5487). 254 pages. $32.00.*


***Harnessing the Sky: Frederick "Trapnell, the US Navy's Aviation Pioneer, 1923-52.*** *Frederick M. Trapnell Jr. and Dana Trapnell Tibbits. Naval Institution Press, Annapolis, MD (800-233-8764). 238 pages. $29.95.*

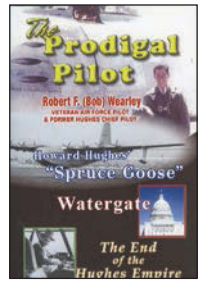

***Hit the Target: Eight Men Who Led the Eighth Air Force to Victory Over the Luftwaffe.*** *Bill Yenne. NAL Caliber, New York (800-726-0600). 369 pages. $26.95.*



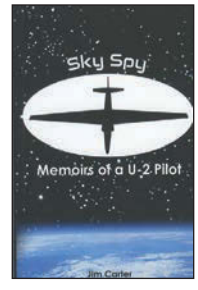

***NORAD and Cheyenne Mountain AFS.*** *J. Brian Lihani. Arcadia Publishing, Mount Pleasant, SC (888-313-2665). 95 pages. $22.99.*




***North American F-86F Sabre: The Birth of a Modern Air Force.*** *Gonzalo Ávila and Roberto Yáñez. Schiffer Publishing, Atglen, PA (610-593-1777). 56 pages. $19.99.*

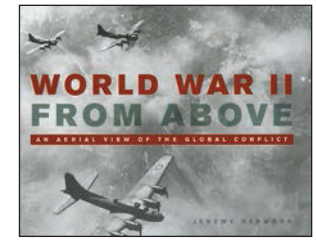



***The Prodigal Pilot: The End of the Hughes Empire.*** *Robert F. Wearley. FastPencil, Campbell, CA (408-540-7571). 171 pages. $19.99.*




***Sky Spy: Memoirs of a U-2 Pilot.*** *Jim Carter. Order from: www.amazon.com. 271 pages. $8.99.*


***Tupolev Tu-4: The First Soviet Strategic Bomber.*** *Yefim Gordon and Dmitriy Komissarov. Schiffer Publishing, Atglen, PA (610-593-1777). 240 pages. $49.99.*




***World War II From Above: An Aerial View of the Global Conflict.*** *Jeremy Harwood. Zenith Press, Minneapolis (800-458-0454). 201 pages. $30.00.*

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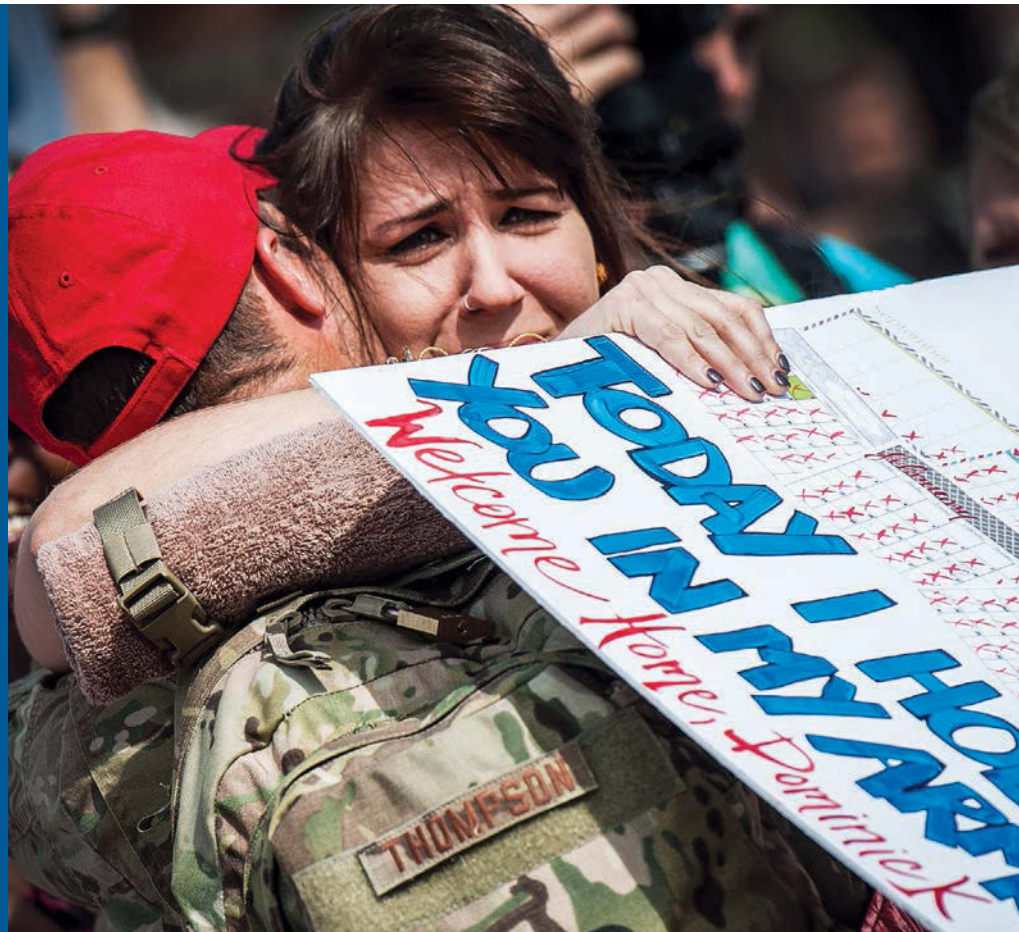

# MacArthur Warns: Accept No Substitutes

*On April 19, 1951, US Army Gen. Douglas MacArthur delivered a famous farewell address. Eight days earlier he had been relieved as commander of US forces in the Korean War. President Harry Truman, who sacked him, had denied the general's demand to expand the war to China, only to hear him publicly criticize the Commander in Chief. "I fired him," said Truman, "because he wouldn't respect the authority of the President. ... I didn't fire him because he was a dumb son of a bitch, although he was." Congress decided to give the extremely popular general his say, and invited him to address a joint session. In it, MacArthur laid out the danger for the US of fighting a defensive war, one it didn't intend to win. As MacArthur famously and bluntly put it, "In war, there can be no substitute for victory."*

**"Old Soldiers Never Die"**

Gen. Douglas MacArthur
Address to the US Congress
Washington, D.C.
April 19, 1951

**Find the full text on the *Air Force Magazine's* website www.airforcemag.com**
"Keeper File"

While I was not consulted prior to the President's [June 27, 1950] decision to intervene in support of the Republic of Korea, that decision, from a military standpoint, proved a sound one. As I said, [it] proved [to be] a sound one, as we hurled back the [North Korean] invader and decimated his forces. Our victory was complete, and our objectives within reach, when Red China intervened [Oct. 25, 1950] with numerically superior ground forces.

This created a new war and an entirely new situation—a situation not contemplated when our forces were committed against the North Korean invaders, a situation which called for new decisions in the diplomatic sphere to permit the realistic adjustment of a military strategy. Such decisions have not been forthcoming.

While no man in his right mind would advocate sending our ground forces into continental China, and such was never given a thought, the new situation did urgently demand a drastic revision of strategic planning if our political aim was to defeat this new enemy [China] as we had defeated the old.

Apart from the military need, as I saw It, to neutralize the sanctuary protection given the enemy north of the Yalu, I felt that [China's intervention] ... made necessary ... the intensification of our economic blockade against China, ... the imposition of a naval blockade against the China coast, ... removal of restrictions on air reconnaissance of China's coastal area and of Manchuria, ... removal of restrictions on the forces of the Republic of China on Formosa, with logistical support to contribute to their effective operations against the [Chinese mainland].

For entertaining these views—all professionally designed to support our forces committed to Korea and bring hostilities to an end with the least possible delay and at a saving of countless American and allied lives—I have been severely criticized in lay circles, principally abroad, despite my understanding that, from a military standpoint, the above views have been fully shared in the past by practically every military leader concerned with the Korean campaign, including our own Joint Chiefs of Staff.

I called for reinforcements but was informed that reinforcements were not available. I made clear that if not permitted to destroy the enemy built-up bases north of the Yalu, if not permitted to utilize the friendly Chinese force of some 600,000 men on Formosa, if not permitted to blockade the China coast to prevent the Chinese Reds from getting succor from without, and if there was to be no hope of major reinforcements, the position of the command from the military standpoint forbade victory.

We could hold in Korea by constant maneuver and in an approximate area where our supply line advantages were in balance with the supply line disadvantages of the enemy, but we could hope at best for only an indecisive campaign with its terrible and constant attrition upon our forces if the enemy utilized its full military potential. ...

Efforts have been made to distort my position. It has been said in effect that I was a warmonger. Nothing could be further from the truth. I know war as few other men now living know it, and nothing to me is more revolting. ... But once war is forced upon us, there is no other alternative than to apply every available means to bring it to a swift end. War's very object is victory, not prolonged indecision.

In war, there can be no substitute for victory. ...

I am closing my 52 years of military service. When I joined the Army, even before the turn of the century, it was the fulfillment of all of my boyish hopes and dreams. The world has turned over many times since I took the oath ... at West Point, and the hopes and dreams have long since vanished, but I still remember the refrain of one of the most popular barrack ballads of that day which proclaimed most proudly that old soldiers never die; they just fade away. And like the old soldier of that ballad, I now close my military career and just fade away, an old soldier who tried to do his duty as God gave him the light to see that duty. Good-bye. ✪

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# AFA National Report

natrep@afa.org

**By Frances McKenney,** Assistant Managing Editor

### AFA ACEs It

When New Hampshire's **Brig. Gen. Harrison R. Thyng Chapter** helped introduce students to aviation careers, the Air Force Association's fingerprints were all over the project.

The chapter rounded up an AFA Chapter Matching Grant—$400 from the chapter and $400 from AFA—and used the funds for orientation flights for the 51 students who attended this summer's fifth annual Aviation Career Education (ACE) Academies at the Laconia Arpt., N.H.

The chapter also funded tuition for a student participating in the week of activities that included model building, trips to aviation industry sites, and flight simulator time.

Daniel Caron, AFA's National Aerospace Teacher of the Year in 2004—and an active chapter member ever since—directs ACE, co-sponsored by the FAA and a local aviation and aerospace education center. Two other former AFA Teachers of the Year for the state instructed at this year's academy: Robert Rotier (2012) and Paul Gelinas (2014).

Among guest speakers, chapter members William J. Moran Jr. and Kevin M. Grady presented briefings on the Civil Air Patrol and on flight planning. The academy tapped state Air National Guard and National Guard units to provide hands-on experiences, guiding the students through their aircraft, facilities, and simulators.

"Dozens of students have experienced aviation careers up close, thanks to the efforts of the chapter," Caron commented.

### Up Front

It's not often AFA gets front-page newspaper publicity—right down to details on the cost of membership—but South Carolina's **Swamp Fox Chapter** earned it with its 15th annual dinner co-sponsored with the Greater Sumter Chamber of Commerce.

*The Sumter Item* sent a reporter to cover the event, where the brand-new 9th Air Force commander at Shaw Air Force Base, Maj. Gen. Mark D. Kelly, made his first local speech. He described USAF's flexibility and quick reaction capability. ✪

Photo by Julie Sicks-Panus

***Eighth-grader Christopher Crosbie-Villaseca from Oyster River Middle School in Durham, N.H., prepares a model rocket for launching. The Thyng Chapter helped sponsor this weeklong introduction to aviation careers. Students in grades three through high school used these model rockets to learn about flight theory.***

## From Desert Shield to Inherent Resolve: Did You Serve?

*Air Force Magazine* needs AFA chapter members' photos for a feature called "25 Years of USAF at War."

We're seeking personal (not Public Affairs) snapshots of you, on Active Duty, in the Guard, or Reserve, in named Operations or Exercises, from Desert Shield (August 1990) to today.

We want **UNPOSED, CANDID** photos showing you **IN ACTION**.

Email images to: fmckenney@afa.org, subject line: 25 Years at War.

Mail images to: *Air Force Magazine,* 25 Years at War, 1501 Lee Hwy., Arlington, VA 22209.

Please include a paragraph describing the action in the photo, where it was taken, when, and the name of the Operation.

Deadline is Nov. 25, 2015.

***This is the kind of unposed, candid, action photo we're looking for: Air National Guardsman A1C Arie Church, in civilian life an* Air Force Magazine *associate editor, conducts a walkaround of a D.C. ANG F-16 in March on deployment to RAAF Base Tindal, Australia.***

## How to Attract Media Attention

CyberPatriot, AFA's national youth cyber defense competition, offers everything positive for local media to spotlight: a hot topic, smart young students, education, and patriotism.

Tennessee's **Gen. Bruce K. Holloway Chapter** recognized this and leveraged the accomplishments of a local CyberPatriot team into a four-minute TV segment aired by the local NBC station, WBIR. This didn't happen by chance.

■ The chapter had a news angle. The CyberPatriot team from Knoxville's Farragut High School first entered the CyberPatriot competition in the 2011-12 season, and the "Cyber Admirals" have been state champions ever since, most recently beating more than 50 other Tennessee teams.

■ The chapter chose the right target. According to Rafael Pubillones, aerospace education VP, the chapter pitched their story idea to a "veteran-friendly anchor" who did a regular "Service & Sacrifice" feature every Thursday on the evening news.

■ They made it easy. The chapter sent newsman John Becker a "read-ahead": quick facts about CyberPatriot and the Farragut team.


Screen grab courtesy of WBIR

*Farragut High School's CyberPatriot team demonstrates for a Knoxville TV station how they trained for CyberPatriot. L-r: Team mentor Greg Hinkel and students Sam MacLean, Bailey Holland, and Matt Fisher.*

■ They handled some logistics. They stayed in touch with Becker to see the project through. VP John H. Grueser served as a point of contact with the high school. They lined up Chapter President Stephen J. Dillenburg and Grueser, an Air Force retired brigadier general, as interview subjects.

■ The two chapter "talking heads" had sound bites ready. "The TV medium is focused on time," Pubillones reminds us, so Dillenburg and Grueser prepped with the same read-ahead that the anchor used.

The chapter's advice on how to grab TV time holds for other media outlets, too.

Here is the result of the Holloway Chapter's efforts:

http://on.wbir.com/1WEPpIf.

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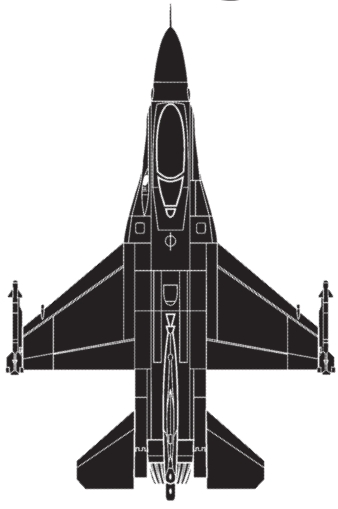
Artwork by Zaur Eylanbekov

# F-16 Fighting Falcon

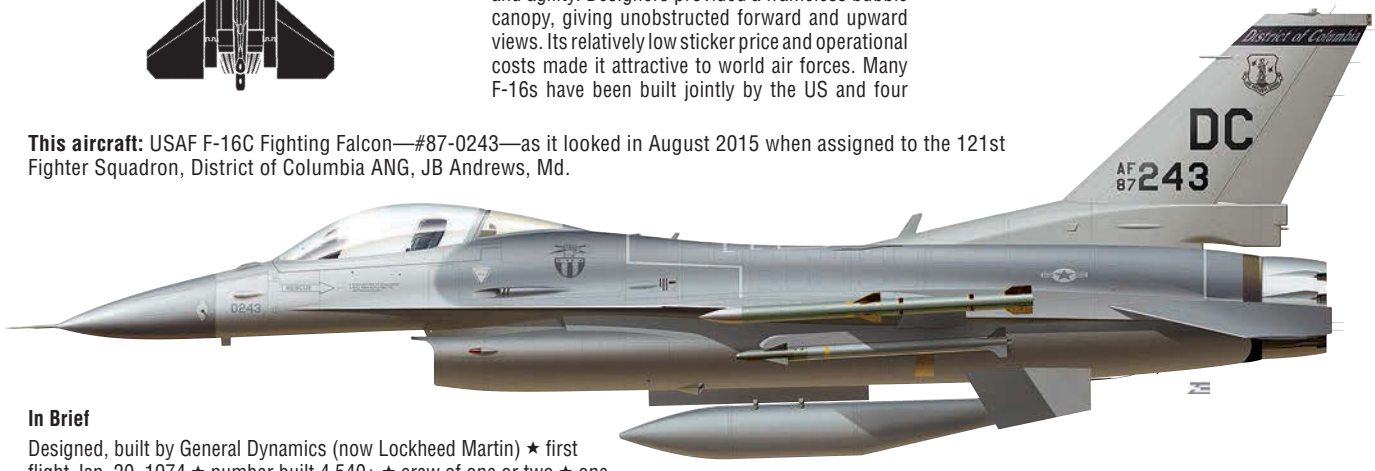


The F-16 Fighting Falcon rates as one of the world's premier military aircraft. The lightweight, single-engine, supersonic, and highly maneuverable fighter, with its cropped-delta planform, became a multirole workhorse of the US Air Force in the 1980s and of some two dozen other air arms since. General Dynamics designed it to be low cost, easy to maintain, and adaptable to many missions and technologies. It has compiled a sturdy combat record.

The F-16 emerged from the Lightweight Fighter program of the 1970s, promoted by air-combat iconoclast Col. John Boyd. The fighter had electronic "fly-by-wire" flight controls. Light weight and a powerful engine produced exceptional quickness and agility. Designers provided a frameless bubble canopy, giving unobstructed forward and upward views. Its relatively low sticker price and operational costs made it attractive to world air forces. Many F-16s have been built jointly by the US and four NATO members: Belgium, Denmark, the Netherlands, and Norway.

Israel was the first to use the F-16 in both air-to-air combat (April 28, 1981, over Lebanon) and in air-to-ground combat (June 7, 1981, raid on Iraq's Osirak nuclear site). In the Gulf War, USAF F-16s flew the lion's share of attack sorties, striking Iraqi airfields, army facilities, Scud sites, and more. F-16s followed up in Northern and Southern Watch and Allied Force in 1999, suppressing enemy air defenses and flying both counterair and close air support missions. In Afghanistan and Iraq, plus interventions in Libya and Syria, the F-16 contribution was extensive.

*—Robert S. Dudney with Walter J. Boyne*




**This aircraft:** USAF F-16C Fighting Falcon—#87-0243—as it looked in August 2015 when assigned to the 121st Fighter Squadron, District of Columbia ANG, JB Andrews, Md.

### In Brief

Designed, built by General Dynamics (now Lockheed Martin) ★ first flight Jan. 20, 1974 ★ number built 4,540+ ★ crew of one or two ★ one F110-GE-100 turbofan engine or Pratt & Whitney F100-PW-200/220/229 turbofan engine. **Specific to F-16C:** defensive armament, one 20 mm Vulcan cannon; up to six AIM-9 Sidewinder, AIM-120 AMRAAM, or combination ★ external load, up to 12,000 lb of bombs and munitions, including Maverick, HARM, JASSM, JDAM, nuclear weapons ★ max speed 1,320+ mph ★ cruise speed approx 550 mph ★ max combat radius 575 mi ★ weight (loaded) 37,500 lb ★ span 32 ft 10 in ★ length 49 ft 4 in ★ height 16 ft 8 in ★ service ceiling 50,000+ ft.

### Famous Fliers

**Air Force Cross:** William Andrews. **Silver Star:** Burt Bartley, Sonny Blinkinsop, Julian Chesnutt, Cary Culbertson, Guy Dahlbeck, Steve Giovenella, Adam Kavlick, Jay Lindell, William Thomas Jr. **Mackay Trophy:** Charles Moore, Stephen Williams, Lawrence Sullivan, Kristopher Struve. **USAF Notables:** Gary North (first USAF kill), Robert Wright (three kills, one mission), Nicole Malachowski (first woman Thunderbirds pilot), Dan Hampton (four DFCs), Mike Brill (6,000 hours). **Other USAF Notables:** Chuck Wald, Chuck Yeager. **Israeli Notables:** Amir Nachumi (F-16 ace), "Lieutenant Rafi" first F-16 kill, Zeev Raz, Amos Yadlin, Dobbi Yaffe, Hagai Katz, Iftach Spector, Relik Shafir, Ilan Ramon (Osirak raid). **Other Foreign Notables:** Peter Tankink (first post-WWII Royal Netherlands AF kill). **Test pilots:** Phil Oestricher, Neil Anderson.

### Interesting Facts

Nicknamed "Viper" ★ won 1975 Collier Trophy ★ succeeded the F-4 "Wild Weasel" as a SEAD platform ★ in hands of Israeli pilots, downed 44 Syrian fighters (no losses) in 1982 Bekaa Valley War ★ featured in films "Iron Eagle" (1986) and "The Sum of All Fears" (2002) ★ can perform 9G turn with full fuel load ★ flown by Thunderbirds ★ equips 25 foreign air arms ★ built to be aerodynamically unstable, and thus agile ★ used by Navy in aggressor role ★ has thrust-to-weight ratio greater than one, meaning it can accelerate vertically.

USAF photo by SSgt Larry E. Reid Jr.

*USAF's air demonstration team, the Thunderbirds, flies F-16s.*

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